The Futures Market
Introduction and Mechanics

20,000 tons of coal delivered to Pier 51 for Aexecor in early days of auto trading on the WTFSE.

```
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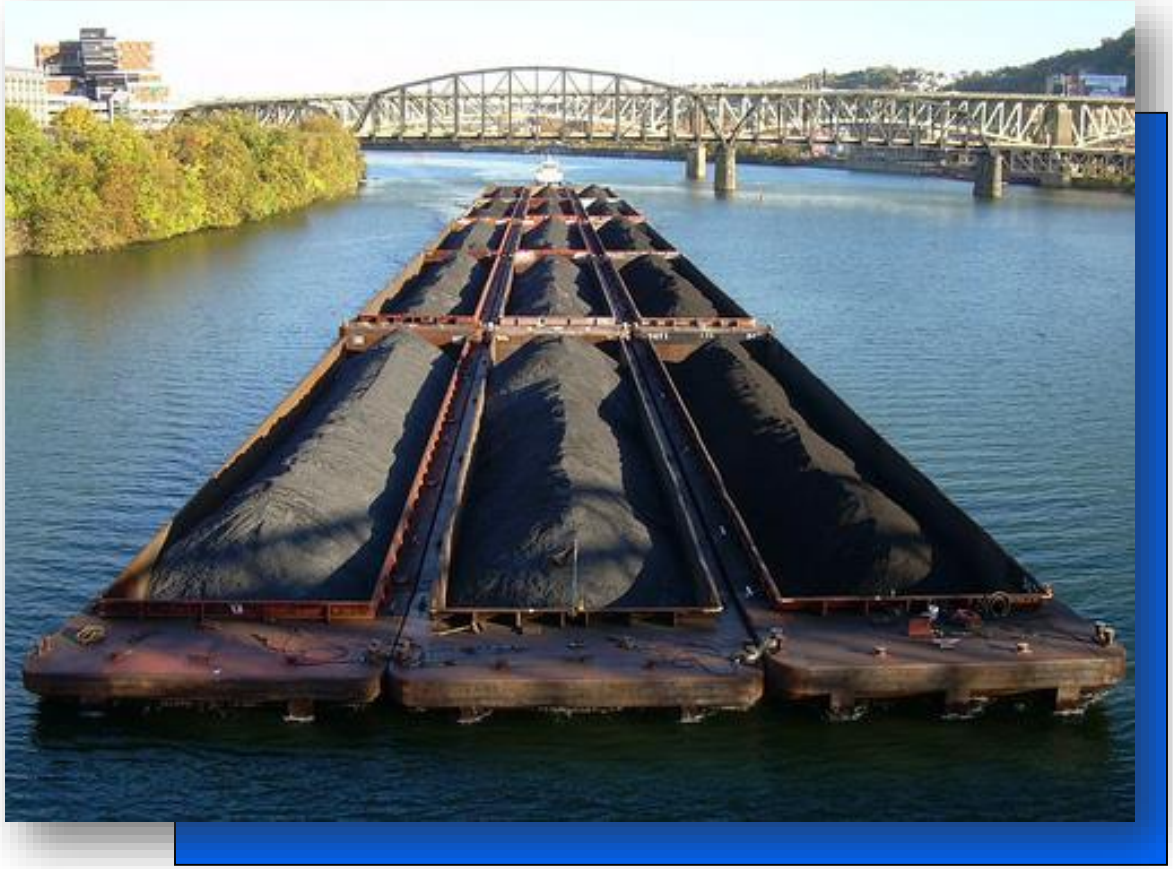

Code was binary, should have been a “0”.

Thanks to Anatole Paine for this story,

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Econ 104 2nd exam distribution, fall 2019

Add 5 points to your numeric score, then find the resulting score in this distribution. If you already had a score of 196 or above, your new score is above 200. You were not capped.

Grade distribution Second Econ 104 exam Fall 2019			
From	To	Number	Grade eq
170	200	97	A
160	169	27	A-
155	159	13	B+
150	154	10	B
140	149	19	B-
130	139	19	C+
120	129	20	C
115	119	4	C-
Below		12	D
Total		221	

Number represents the number of students (of 221) in that bracket. There are still a few makeup exams to be given.

What are futures contracts?

A futures contract allows a trader to undertake a contract to **accept *or* make** delivery of a commodity or some kind of financial asset (a) in the future on a known date, (b) under specified conditions, (c) for a price contracted today.

The party to the contract who is agreeing to take delivery of the commodity is **long** in the position, whereas the party who is agreeing to deliver the commodity is **short** in the position. A speculator will benefit when she is long if the prices rise, short if the price falls.

Through submission of bids and asks, the exchange will match long orders with short orders, either with outside traders or with their own trades.

An example of a futures contract

On November 11, 2019, you could have agreed to pay $56.74 per barrel (42 gallons) for 1,000 barrels of light sweet crude oil (with 0.42% sulfur or less) for delivery at an agreed time during the month of December to a facility at Cushing, Oklahoma, F.O.B.

This contract was traded at the New York Mercantile Exchange (now CMEGroup), one of many futures exchanges in the United States.

Like options, you can speculate or hedge in this contract without taking delivery - you simply reverse your position before the last trading day.

Key terms

- Spot price: Today's cash price.
- Futures price: Today's price of a specified futures contract, like December 2019 NYMEX light sweet crude contract.
- Expected future spot price: Exactly what the name implies. (There is a theory that says that this price will not be the same as the futures price).
- Volume: The number of contracts traded today (or in any period of time)
- Open interest: The number of contracts that are "open," that exist right now, that have a matched long and short position.
- e-Mini contract: A much smaller contract in some commodity, typically electronically traded.

Types of Futures Contracts

- **Energies**: Oil, gasoline, diesel, heating oil, natural gas, ethanol
- **FX**: Euro, Pound, Yen, Peso, etc. (more than FOREX), mostly but not entirely priced in Dollars (called Crosses if not).
- **Rates**: Interest rate futures in mostly Dollar and Euro.
- **Indices**: Multiple stock indices of different countries.
- **Metals**: Aluminum, gold, palladium, platinum, copper, silver, uranium
- **Ag commodities**: Corn, wheat, soybeans, rice, coffee, oats, cattle, hogs, pork bellies, cotton, lumber, cocoa, milk, sugar, orange juice
- **Exotics**: Weather (heat).

The exchanges

The primary futures exchanges in the U.S. *were* the New York Mercantile Exchange (NYMEX), the Chicago Board of Trade (CBOT), and the Chicago Mercantile Exchange (CME) and the New York Board of Trade (NYBOT). In 2007 the first three exchanges listed here were merged into the **CMEGroup** [NYSE: CME]. Globex, an electronic trading arm, is a division of the CMEGroup.

The huge, global **IntercontinentalExchange** [NYSE: ICE], which bought NYBOT in 2007, competes with the CMEGroup and emphasizes electronic trades. ICE trades energy futures through the U.K.-regulated London market, and its commodity, foreign exchange, and index futures through a U.S.-regulated market.

Formerly exchanges sold "seats" allowing members to trade on the exchange floor, called the "pit" and to bid and ask using a complicated system of hand signals and verbal orders in an "open outcry" system. This system is similar to that used on the NYSE.

Electronic trading is rapidly replacing open outcry. ICE is purely electronic.

Trades are cleared through a clearinghouse that matches buy and sell orders. The "clearing member" is a market maker who assures that all trades are matched, or matches it himself.

Web sites

Intercontinental Exchange (owns NYME): http://www.theice.com

CME Group (CME and CBOT): http://www.cmegroup.com

Ino (good free site for checking prices): http://www.ino.com

Kitco (metals): http://www.kitco.com

and any brokerage site that offers futures.

Class assignment: Peruse the CMEGroup site before the next lecture and see what information they provide. **Look at the list of commodities they trade and look at their contract specifications and prices.**

CMEGroup futures chains ...

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November 13, 2019

Monthly to Dec 2021, periodic until Sep 2024

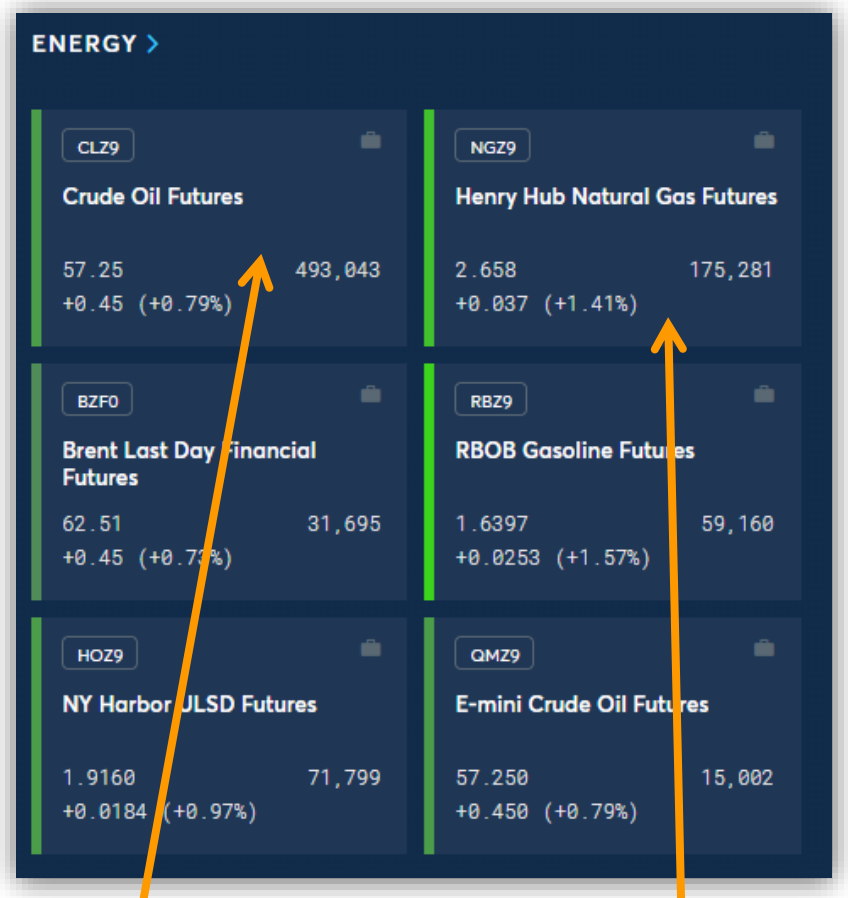
Copper Futures Quotes
Globex

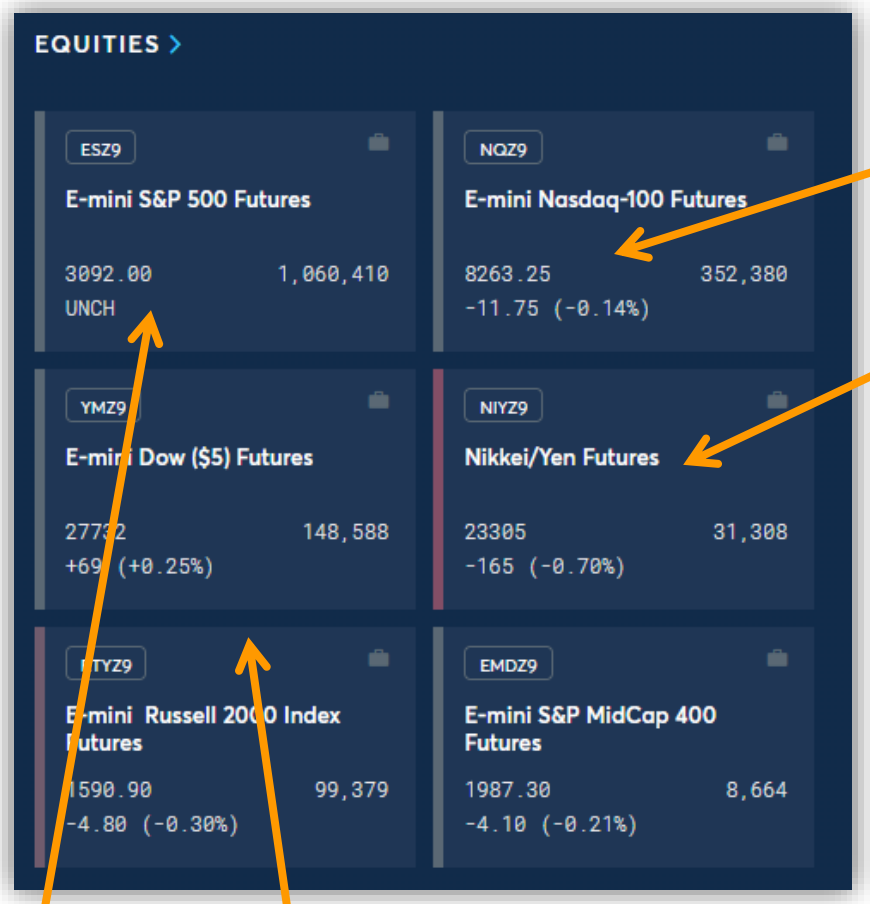
View Another Product

Quotes | Settlements | Volume | Time & Sales | Contract Specs | Margins | Calendar

Month	Options	Charts	Last	Change	Prior Settle	Open	High	Low	Volume	Hi / Low Limit	Updated
NOV 2019	OPT		2.6300	-0.0120	2.6420	2.6325	2.6355	2.6300	287	No Limit / No Limit	12:02:04 CT 13 Nov 2019
DEC 2019	OPT		2.6375	-0.0080	2.6455	2.6465	2.6515	2.6330	60,908	No Limit / No Limit	14:37:03 CT 13 Nov 2019
JAN 2020	OPT		2.6410	-0.0090	2.6500	2.6530	2.6545	2.6375	737	No Limit / No Limit	14:25:28 CT 13 Nov 2019
FEB 2020	OPT		2.6480	-0.0060	2.6540	2.6515	2.6515	2.6445	316	No Limit / No Limit	12:04:43 CT 13 Nov 2019
MAR 2020	OPT		2.6480	-0.0085	2.6565	2.6570	2.6625	2.6450	19,523	No Limit / No Limit	14:33:55 CT 13 Nov 2019
APR 2020	OPT		2.6525	-0.0085	2.6610	2.6525	2.6525	2.6525	4	No Limit / No Limit	12:02:04 CT 13 Nov 2019
MAY 2020	OPT		2.6530	-0.0110	2.6640	2.6640	2.6740	2.6525	4,310	No Limit / No Limit	13:29:59 CT 13 Nov 2019
JUN 2020	OPT		2.6775	+0.0095	2.6680	2.6600	2.6775	2.6585	4	No Limit / No Limit	12:02:04 CT 13 Nov 2019
JUL 2020	OPT		2.6620	-0.0090	2.6710	2.6745	2.6745	2.6600	1,876	No Limit / No Limit	14:15:13 CT 13 Nov 2019

What I look at every Sunday night ...





e-Mini NASDAQ 100

Nikkei Stock Index (in Yen)

WTI Crude

Nat Gas

e-mini S&P 500

eMini DOW

Source: **CME Group home page**

More examples ...

Sample CMEGroup Futures Contracts

	Size	2013	Now
Light Sweet Crude	1,000 bbls.	95	56.77
Natural Gas	10,000 mmBtu	3.577	2.59
Wheat	5,000 bushels	7.062	507'2
Oats	5,000 bushels	3.114	300'6
No 11 Sugar	112,000 pounds	0.1797	0.1273
E-mini S&P 500	50 X S&P 500	1767.75	3120.5
S&P 500	250 X S&P 500	1767.6	3120.5
EUR/USD	$10,000	1.3411	1.10805
Gold GC	100 Troy ounces	1281.0	1471.8
Copper HG	25,000 pounds	3.262	2.6195

Quotes are in $, some contract quotations in cents.
Prices are for November 11, 2013 and Nov 18, 2019.
Source: CMEGroup

The Dec 2019 CLZ Light Sweet Crude Oil Contract on November 13, 2019

Futures price was $57.28 on 11/13/2019

Spot price was about the same?

A single contract, the December 2019 CMEGroup CLZ2019, D.

NYMEX light sweet crude contracts

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Month	Options	Charts	Last	Change	Prior Settle	Open	High	Low	Volume	Hi / Low Limit	Updated
DEC 2019	OPT		57.26	+0.46	56.80	56.79	57.53	56.20	497,896	No Limit / No Limit	14:43:40 CT 13 Nov 2019
JAN 2020	OPT		57.33	+0.48	56.85	56.83	57.60	56.27	179,775	No Limit / No Limit	14:43:44 CT 13 Nov 2019
FEB 2020	OPT		57.21	+0.47	56.74	56.76	57.47	56.16	57,563	No Limit / No Limit	14:43:39 CT 13 Nov 2019
MAR 2020	OPT		56.92	+0.44	56.48	56.42	57.16	55.92	47,712	No Limit / No Limit	14:43:39 CT 13 Nov 2019
APR 2020	OPT		56.59	+0.41	56.18	56.18	56.80	55.65	22,614	No Limit / No Limit	14:43:40 CT 13 Nov 2019
MAY 2020	OPT		56.19	+0.35	55.84	55.72	56.39	55.29	11,944	No Limit / No Limit	14:43:39 CT 13 Nov 2019
JUN 2020	OPT		55.78	+0.33	55.45	55.36	55.97	54.89	40,102	No Limit / No Limit	14:43:44 CT 13 Nov 2019
JUL 2020	OPT		55.38	+0.33	55.05	54.90	55.52	54.50	8,477	No Limit / No Limit	14:43:39 CT 13 Nov 2019
AUG 2020	OPT		54.98	+0.32	54.66	54.23	55.07	54.23	3,656	No Limit / No Limit	14:43:46 CT 13 Nov 2019
SEP 2020	OPT		54.59	+0.29	54.30	54.17	54.72	53.78	7,920	No Limit / No Limit	14:43:46 CT 13 Nov 2019
OCT 2020	OPT		54.19	+0.18	54.01	53.92	54.37	53.92	5,565	No Limit / No Limit	14:43:46 CT 13 Nov 2019
NOV 2020	OPT		53.92	+0.15	53.77	53.69	53.93	53.23	3,603	No Limit / No Limit	14:43:46 CT 13 Nov 2019
DEC 2020	OPT		53.80	+0.22	53.58	53.49	53.95	53.03	26,247	No Limit / No Limit	14:43:46 CT 13 Nov 2019

Source:
http://www.CMEGroup.com

What do we need to know about the Crude contract?

- Contract size
  - 1,000 bbls (42,000 gallons)
- Pricing of quote
  - $ per bbl
- The exchange
  - CMEGroup (formerly NYMEX)
- **Initial margin requirement (dec)**
  - **$4,400** (lowers by the month)

Exchange	Asset Class	Product	Product Code	Start Period	End Period	Maintenance
NYM	CRUDE OIL	CRUDE OIL FUTURE NYMEX	CL	10/2019	12/2019	4,000 USD
NYM	CRUDE OIL	CRUDE OIL FUTURE NYMEX	CL	01/2020	01/2020	3,975 USD
NYM	CRUDE OIL	CRUDE OIL FUTURE NYMEX	CL	02/2020	02/2020	3,925 USD
NYM	CRUDE OIL	CRUDE OIL FUTURE NYMEX	CL	03/2020	03/2020	3,850 USD
NYM	CRUDE OIL	CRUDE OIL FUTURE NYMEX	CL	04/2020	04/2020	3,775 USD
NYM	CRUDE OIL	CRUDE OIL FUTURE NYMEX	CL	05/2020	05/2020	3,725 USD
NYM	CRUDE OIL	CRUDE OIL FUTURE NYMEX	CL	06/2020	06/2020	3,650 USD
NYM	CRUDE OIL	CRUDE OIL FUTURE NYMEX	CL	07/2020	07/2020	3,575 USD

need to know ... (cont).

- **Maintenance Margin**
  - **$4,000**
- Last trading date
  - 3rd business day prior to the 25th day of the month in the preceding month of the contract (Nov 20 for Dec, 2019).
- Delivery date or period
  - By arrangement, anytime in the month of the contract.
- Delivery location
  - Various named locations in Cushing, Oklahoma or pipeline access to TEPPCO or Equilon Pipeline Co.

Margins and Leverage

- ✓ Initial Margin - The amount of cash per contract that you must have in your account prior to trading. ($4,400)
- ✓ Maintenance Margin - If the amount of cash per contract falls below this value, you will get a margin call and must replenish cash balance. ($4,000)
- ✓ Notional Value of Contract - Contract size times price
  - ➢ $57.64 X 1,000 = $57,640
- ✓ Leverage (maximum) - The notional value of the contract divided by the initial margin.
  - ➢ [$57.64 X 1000] / 4,400 = 13.1 to 1
- ✓ Each penny move in the price of oil affects the margin account by $10.00 per contract.

From Chapter 10 – current margins for select contracts

Select CME Group Futures Contracts

Contract	Type	Size	Recent Price or Value[1]	Initial Margin[2]	Maint Margin	Notional Value[3]	Max Implied Leverage[4]
Sugar No. 11	Commodity	112,000 pounds	0.1259	990	900	$14,100	14
S&P 500	Equity Index	250 X S&P 500	3,083.40	33,000	30,000	$770,850	23
E-mini S&P 500	Equity Index	50 X S&P 500	3,095.75	6,600	6,000	$154,170	23
Micro E-mini S&P 500	Equity Index	5 X S&P 500	3,095.75	660	600	$15,470	23
EUR/USD (Euro FX)	Exchange rates	125,000 Euros	1.10005	1,980	1,800	$141,438	71
E-mini EUR/USD	Exchange rates	62,500 Euros	1.1026	990	900	$68,913	70
Micro EUR/USD	Exchange rates	12,500 Euros	1.1025	198	$180	$14,215	72
10-Year U.S. Treasury Note	Interest rate	$ 100,000 maturity	128'220	1,430	$1,300	$128,688	90

Notes:

1: On November 13, 2019 for nearest-term contract, in some cases approximate.

2: As of November 13, 2019.

3: Contract size times recent price or value, rounded.

4. 20 would be interpreted 20-to-1. Approximately equal to notional value divided by initial margin.

5: These exchanges still use the absurdly quaint convention of quoting bonds and notes in 32nds. '135 would mean 13.5/32, or 0.421875.

Important! When you go long or short on a futures contract, it does not affect the cash in your account ..

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Before ...

+/-	Time	Fin Instrument	Action	Quantity	Price	Exch.	Commission	Account
	09:22:46	NG Jan'19 @NYMEX	SLD	1	4.300	NYMEX	2.37	U1395405

MONITOR | Portfolio | Trades | + | Filter ?

P&L + PROFILE

DAILY -160 Since prior Close -0.26%

Unrealized -2.4K
Realized

Margin + ACCOUNT

Net Liq 61.0K Excess Liq 44.8K
Maintenance 0 SMA --

Portfolio	POS	CST BSS	MKT VL	BID	ASK	LAST	CHNG	P&L	UNRLZD P...
GLD	100	12,304	11,462	114.62	114.63	114.62	-1.02	-102	-842
DBX	200	6,225	4,674	23.35	23.37	23.37	-0.29	-58	-1,551
USD CASH			44,820						

Henry Hub Natural Gas

Financial Instrument	Last	Bid	Ask
NG Jan'19 @NYMEX	4.295	4.295	4.296

Order Description

SELL 1

Order Type LMT Routing NYMEX Time in Force DAY

Limit Price 4.302

Amount

Amount	43,020.00 USD
Commission (est.)	2.37 USD
Total	43,017.63 USD

Margin Impact (in USD)

	Current	Change	Post-trade*
Equity with Loan	44,820	-12	44,807
Initial Margin	0	21,770	21,770
Maintenance Margin	0	5,806	5,806
Position	0	-1	-1

*This is a current projection and is subject to change.

Don't display this message again.

Transmit Cancel

After ...

MONITOR | Portfolio | Trades | + | Filter ?

P&L + PROFILE

DAILY -20 Since prior Close -0.03%

Unrealized -2.3K
Realized

Margin + ACCOUNT

Net Liq 61.0K Excess Liq 39.0K
Maintenance 5.8K SMA --

Portfolio	POS	CST BSS	MKT VL	BID	ASK	LAST	CHNG	P&L	UNRLZD P...
NG Jan'19 @NYMEX	-1	-42,998	-42,855	4.285	4.287	4.287	-0.012	143	143
DBX	200	6,225	4,670	23.33	23.35	23.36	-0.30	-62	-1,555
GLD	100	12,304	11,461	114.61	114.62	114.61	-1.03	-103	-843
USD CASH			44,837						

... effectively, going long or short just starts settlement,

Settlement

Unlike options, futures are not paid for (which is to say, the commodity to be delivered is not paid for) until the delivery of the commodity.

The buyer of the future, however, is required to deposit funds in a special *margin account* which is, at the end of each day, **adjusted to reflect the capital gain or loss**. The starting required balance for this account is called the *initial margin*.

The seller is also required to maintain a margin account that is adjusted daily and if the seller does not own the commodity, may have to meet special requirements.

The account balance must always be kept above the *maintenance margin*, sometimes called the *day margin*.

An example of margin account adjustment

December crude oil futures contract, long 1,000 bbls

Date	Price	Position	Gain	Margin
0 - no trade				5,000
1 - mid day	56.74	56,740	0	5,000
1 - end day	56.52	56,520	-220	4,780
2 - end day	56.48	56,480	-40	4,740
3 - end day	56.22	56,220	-260	4,480
4 - end day	55.02	55,020	-1,200	3,280
5 - end day	56.34	56,340	1,320	4,600
6 - morning	57.02	57,020	680	5,280
				MC

For a short contract, the signs in the Gain would simply reverse.

Each one cent move affects margin by $10. Max leverage is about 17 to 1.

How you pay for delivery
(iff you *take* delivery)

- If you go long (buy) on a futures contract for $57 (such as $57 per barrel of oil), and if you take delivery, you *will* end up paying $57 for the commodity.
- This net cost, however, will consist of two components:
  - the price you pay at delivery, which is *spot* for that day, and
  - the results of the daily adjustment to your margin account, whether a capital gain or capital loss.
- Therefore, you are ***effectively paying $59 because of the adjustment in your margin account.***

Example

Very important slide ...

- In November, you buy a December Crude Oil future for $56.74 per barrel (nominal value $56,740). You are long. You want to take delivery.
- Spot price in on the day you enter this contract is $55.82 (not relevant to settlement nor to this contract).
- When Nov 20 arrives, spot price has risen to $59.04.
- Question: What are the settlement terms?
  - You take delivery of the oil in Dec at the Nov 20 spot ($59.04), *not* $56.74, so you pay $59,040.
  - You have gained $2,300 in your margin account.
  - The **total cost** of this contract to you is ($59,040 – 2,300) which equals $55,740 exactly as you intended.
  - The only asset you have is the cash balance of your margin account! (Relevant to delta ETFs).

Margin Account

Date	Price	Position	Gain	Margin
Start	56.74	56,740	0	5,000
End	59.04	59,040	2,300	7,300

Delivery

	Spot	less	Gain	Equals
Net Cost:	59,040		2,300	56,740

Notes on these contracts

1. Short also
   - The previous example was for a long position (taking delivery or the equivalent). With futures, you are just as likely, and it is just as easy, to go short. With that position the trader *makes* delivery or the equivalent. In a spec position you benefit if the price goes down while you are in the contract.
2. Bid/Ask and limit orders
   - When you buy (long) or sell (short) a futures contract, you will pay close attention to the Bid/Ask queue, called the Depth of Market (DOM) queue, which is similar in structure to the NASDAQ Level II queue for stocks, and will likely use a limit order like you would do for stocks and options (see the OpenECry DOM for an example).
3. Implicit Leverage
   - Clearly with futures you have implicit leverage, which equals **at maximum** the *notional value of the position divided by the initial margin*. [Note the example in the second slide after this]. This leverage will clearly compound your gain or loss by the scale of the leverage. Effective leverage equals notional value divided by cash in the account, or cash dedicated to this trade.

Exiting the contract (offset)

Less than 1% of all futures contracts end with delivery of the commodity! Nearly all traders reverse their trades (called "offset") before the contract expiration date.

Remember that the futures price must converge to the spot price as the expiration date approaches. Open interest declines until it is zero.

Generally long positions exit at about the same pace as short positions, so open interest is gradually cleared off by the exchange.

Remember, you did not "buy" or pay for anything when you opened the contract. You agreed to daily settlement terms, which have been satisfied daily. When you offset you do not sell anything or get paid. *You just inform your broker that you are closing out your trade and the exchange says goodbye.*

Most ICE contracts allow either futures swaps (EFP) or cash settlement instead of delivery even if you do not offset. Many contracts are cash settlement only.

Many non-commodity contracts do not have deliverables so offset is automatic.

Example: Online Interface Level II (IB) for NYMEX Crude

Bid				Ask			
MM Name	Price	Size	Cum Size	MM Name	Price	Size	Cum Size
NYMEX	56.65	21	21	NYMEX	56.66	21	21
NYMEX	56.64	62	83	NYMEX	56.67	49	70
NYMEX	56.63	42	125	NYMEX	56.68	50	120
NYMEX	56.62	38	163	NYMEX	56.69	25	145
NYMEX	56.61	43	206	NYMEX	56.70	36	181
NYMEX	56.60	34	240	NYMEX	56.71	34	215
NYMEX	56.59	23	263	NYMEX	56.72	33	248
NYMEX	56.58	17	280	NYMEX	56.73	16	264
NYMEX	56.57	21	301	NYMEX	56.74	25	289
NYMEX	56.56	63	364	NYMEX	56.75	34	323

Orders can be traded directly and quickly from this screen (see the "Armed" button at top.

The British Pound Micro e-Mini

M6B Dec16'19 @GLOBEX Orders

Buttons — Armed

Close Position | Reverse Position | View Account

Deep Book Buttons

GLOBEX

Orders | Log | Trades | Portfolio

Action	Quantity	Type	Lmt Price	Destination	Status

Bid				Ask			
MM Name	Price	Size	Cum Size	MM Name	Price	Size	Cum Size
GLOBEX	1.2972	2	2	GLOBEX	1.2974	29	29
GLOBEX	1.2971	36	38	GLOBEX	1.2975	8	37
GLOBEX	1.2970	4	42	GLOBEX	1.2976	4	41
GLOBEX	1.2969	4	46	GLOBEX	1.2977	4	45
GLOBEX	1.2968	6	52	GLOBEX	1.2978	4	49
GLOBEX	1.2967	9	61	GLOBEX	1.2979	9	58
GLOBEX	1.2966	4	65	GLOBEX	1.2980	7	65
GLOBEX	1.2965	5	70	GLOBEX	1.2981	5	70
GLOBEX	1.2964	4	74	GLOBEX	1.2982	4	74
GLOBEX	1.2963	3	77	GLOBEX	1.2983	4	78

Stock Description

British pound

Product	M6B
Security Type	FUT
Underlying	GBP.USD CASH
Contract Month	DEC19
Expiration Date	DEC 16 '19
Last Trading Date	DEC 16 '19 09:16 CST
Currency	USD
Multiplier	6250
Exchange	GLOBEX
Trading Class	M6B
Symbol	M6BZ9
Product Type	Foreign Exchange
Settlement Method	Physical Delivery

Trading Hours: November 18, 2019 Calendar

Regular Trading Session	08:30 CST - 16:00 CST (06:30 PST - 14:00 PST)
Total Available Hours	*17:00 CST* - 16:00 CST (*15:00 PST* - 14:00 PST)
Exchange Time Zone	Central Standard Time

Note: times in italics are on the calendar date preceding trade date

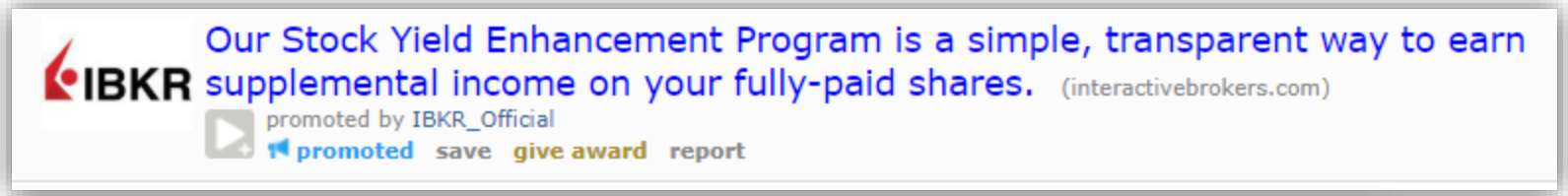
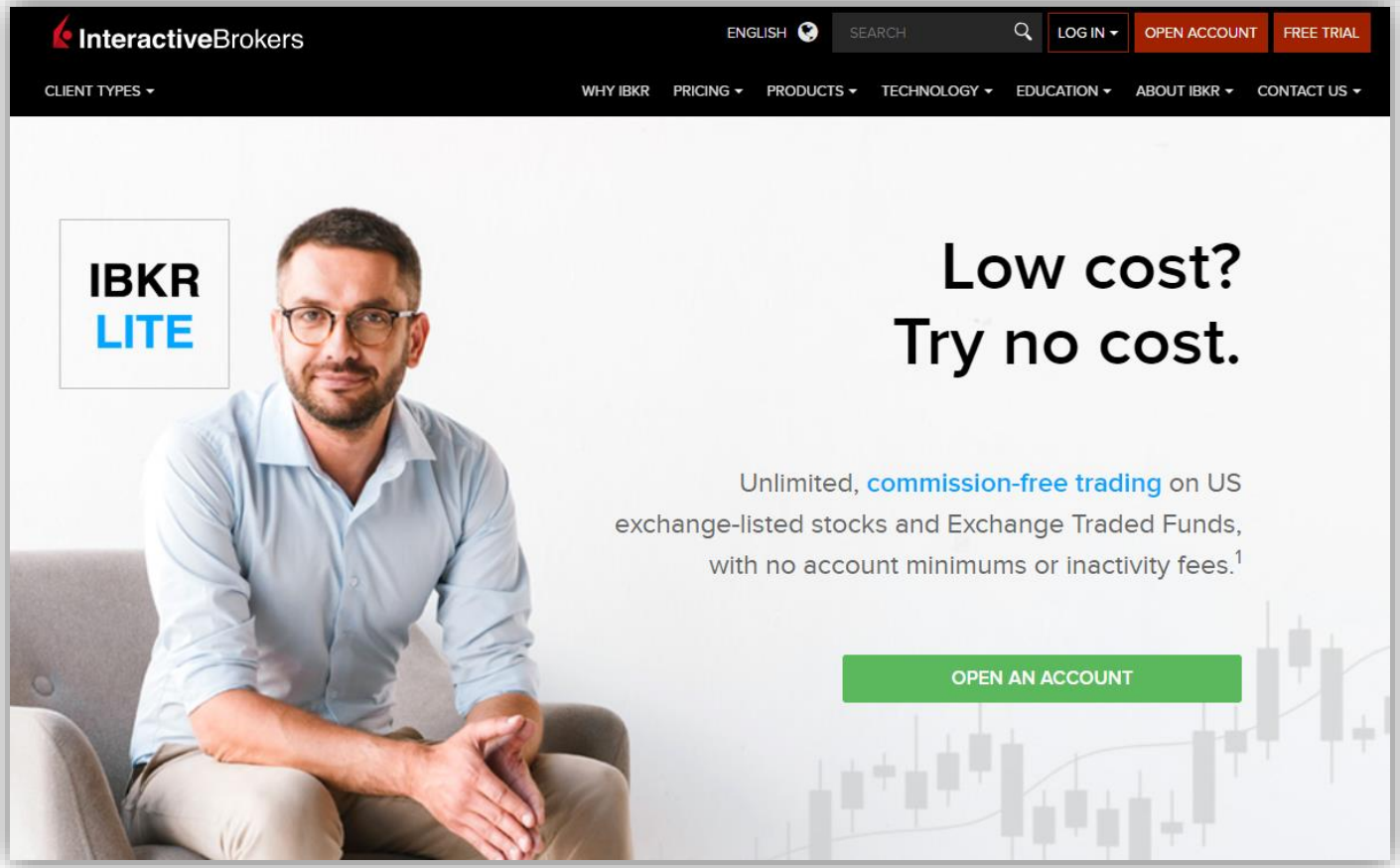
Current Margin Requirements

Intraday Initial	734.48
Intraday Maintenance	587.59
Overnight Initial	734.48
Overnight Maintenance	587.59

Great instrument for small traders – notice the mulitplier is 6250 here, in contrast to 62,500 for the traditional contract. A penny move = $62.50. Notional: $8,107.50. See margins ...

Pricing fundamentals of tangible, storable commodities (like oil)

The prices of tangible, storable commodities like crude oil, natural gas, wheat, copper, and so forth are fundamentally determined by global trends in **supply** (production), **demand** (consumption), and stored **inventory**, which acts as a buffer between supply and demand. Often futures prices, which have a short-run orientation (although they are influenced by long-run expectations) are strongly affected by unexpected inventory fluctuations.

Energy Information Agency Data (weekly, monthly) on oil and nat gas influences prices greatly when expectations not met.

Topical: You can now earn interest on shorts!!!