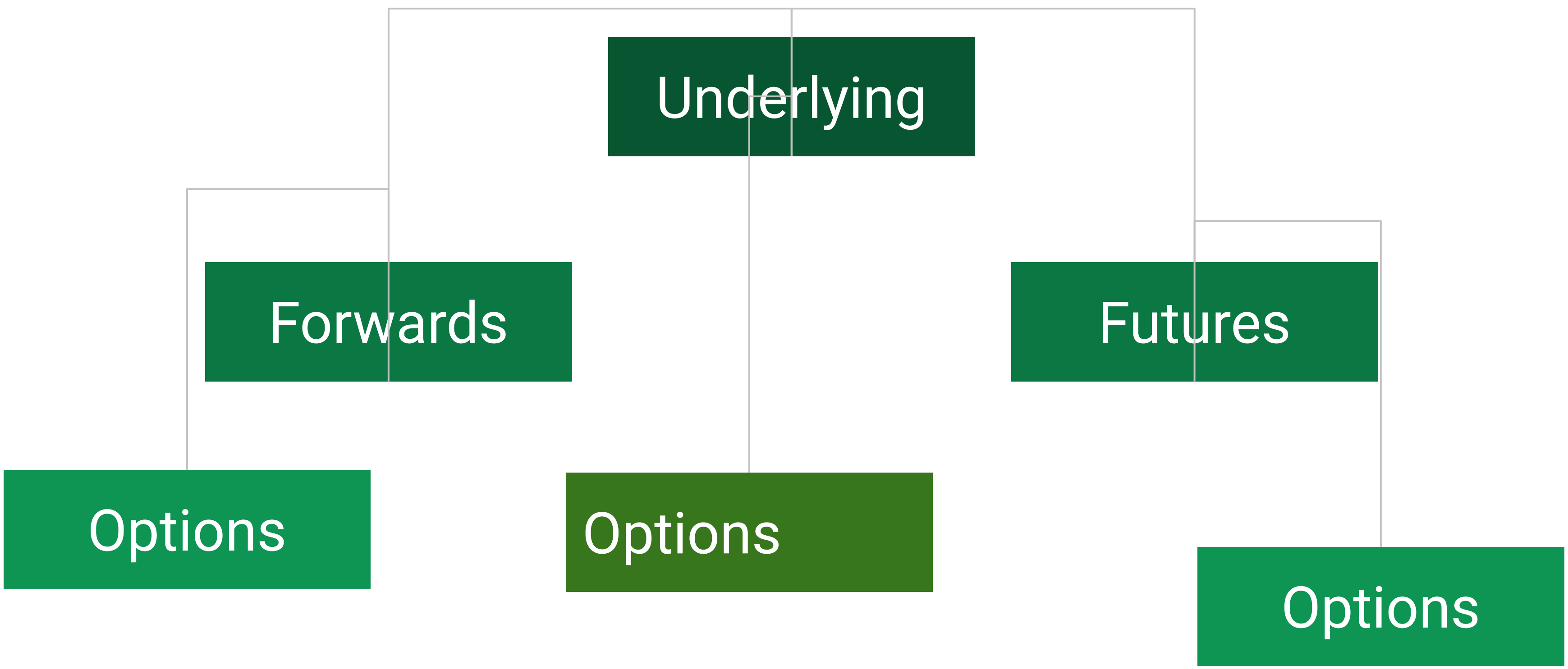
Introduction to Futures & Forwards

- *What are derivatives*
- *Type of derivatives*
- *Leverage*
- *Derivatives markets*
- *Market Participants*
- *What are they good for*

What is a Derivative?

- A derivative is an instrument whose value is derived from, the value of another asset.



Why Derivatives Are Important

- Derivatives intermediate risk across the economy, from those that look to mitigate risk to those market participants that want it.

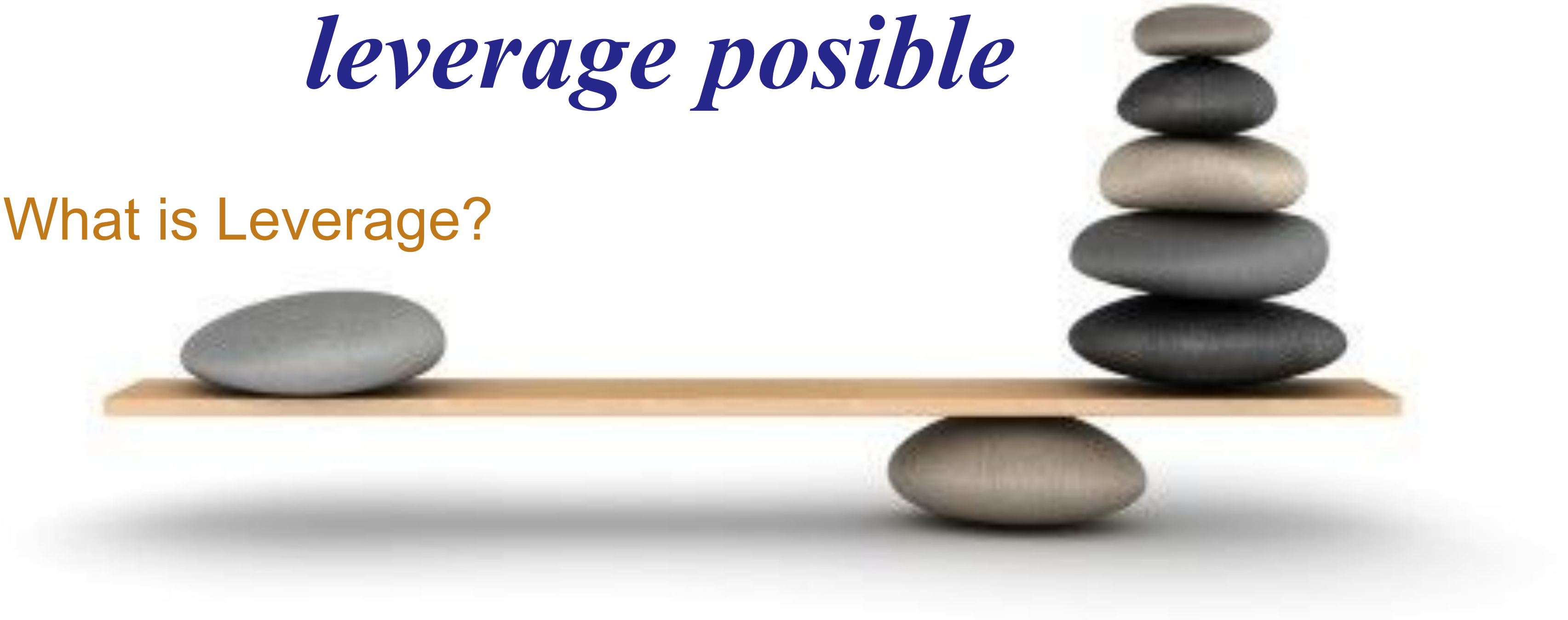
- Underlying assets include:
  - Financial assets such as stocks, currencies, interest rates, debt instruments, credit,volatility
  - Hard assets like commodities, electricity
  - Weather and many many more

- Derivatives are not always apparent. Benign transactions such as a contract to buy electronic components from China may include a derivative

Derivatives can rock the world

Because they make extreme leverage posible

- What is Leverage?



Think about this:
How does leverage work?
Is the pain equal to pleasure?

Derivatives can rock the world

Because they make extreme leverage posible

10% Gain Every Period

	Assets Controled	100	500	1,000
Period	Asset Value No leverage	Gain with 1:1	Gain with 5:1	Gain with 10:1
1	100	-		
2	110	10	50	100
3	121	21	105	210
4	133	33	166	331
5	146	46	232	464

10% Loss Every Period

	Assets Controled	100	500	1,000
Period	Asset Value No leverage	Gain with 1:1	Gain with 5:1	Gain with 10:1
1	100	-		
2	90	(10)	(50)	(100)
3	81	(19)	(95)	(190)
4	73	(27)	(136)	(271)
5	66	(34)	(172)	(344)

Derivatives can rock the world

- 2008 Financial Crisis (the Great Recession)
  - Lehman's filed for bankruptcy on September 15, 2008. This was the biggest bankruptcy in US history
  - Lehman was a counterparty to OTC derivatives with very high leverage
  - Borrowed in the short term and committed to long term cash flows

- Long Term Capital
  - LTCM strategies bought the old benchmark Treasury, say a 19.5 yr T-Bond (now neither cheap or rich) sold newly issued benchmark 20 yr which trades rich. Over time the valuations of the two bonds should converge.
  - LTCM employed massive leverage
  - Federal Reserve had to intervene to prevent a collapse of the system
  - The Russian Financial crisis caused pain to LTCM and Bear Sterns pulled the trigger

Where and How Derivatives Are Traded

- Exchanges (CME, CBOT, LME, NYSE)
- Over the counter (OTC) (via phone, electronic trading, email, text (Bloomberg IB)
- Market Participants
  - Banks, brokers, hedge funds, asset managers, corporations, individuals, governments, farmers

Exchange Traded Markets

CME Group MARKETS DATA SERVICES EDUCATION

Daily Agricultural Volume and Open Interest

VOI By Exchange | Agricultural | Energy | Equities | FX | Interest Rates | Metals

Trade Date

Friday, August 28, 2020 (Final)

DOWNLOAD DATA

PRODUCTS		VOLUME			OVERALL COMBINED TOTAL		
		GLOBEX	OPEN OUTCRY	CLEARPORT/PNT	VOLUME	OPEN INTEREST	CHANGE
Black Sea Corn Financially Settled (Platts) Futures	Futures	0	0	440	440	3,402	140
Black Sea Corn Financially Settled (Platts) Options	+ Options	0	0	0	0	700	0
Black Sea Wheat Financially Settled (Platts) Futures	Futures	254	0	1,510	1,764	28,866	611
Black Sea Wheat Financially Settled (Platts) Options	+ Options	0	0	0	0	3,900	0
Block Cheese Futures	Futures	0	0	0	0	327	0
Options On Block Cheese Futures	+ Options	0	0	0	0	2,378	0

OTC Traded Markets

Global OTC derivatives market
In billions of US dollars

‹ H2 2019	Notional amounts outstanding				Gross market value			
Level: 1 2 3 4	H1 2018	H2 2018	H1 2019	H2 2019	H1 2018	H2 2018	H1 2019	H2 2019
All contracts	594,832	544,383	640,351	558,505	10,326	9,662	12,061	11,598
⊟ Foreign exchange contracts	95,798	90,658	98,560	92,177	2,620	2,257	2,229	2,230
⊟ By instrument								
Outright forwards and forex swaps	56,416	53,908	59,359	54,647	1,249	1,074	1,046	1,111
Currency swaps	26,012	24,856	26,443	26,288	1,155	990	1,008	956
Options	13,307	11,836	12,716	11,205	216	193	176	163
Other products	64	58	43	38				
⊟ By counterparty								
Reporting dealers	40,609	37,706	39,494	35,710	1,146	966	881	862
⊟ Other financial institutions	43,308	41,548	47,072	44,724	1,042	891	952	973
Central Counterparties	2,907	2,709	3,744	3,442	71	59	62	54
Non-financial customers	11,817	11,346	11,951	11,705	431	400	395	395

Source: Bank for International Settlements. https://stats.bis.org/statx/toc/DER.html

Some More Terminology

- **Open interest:** the total number of contracts outstanding
  - equal to number of long positions or number of short positions
- **Settlement price:** the price just before the final bell each day
  - used for the daily settlement process
- **Volume of trading:** the number of trades in one day

Deeper Dive into:

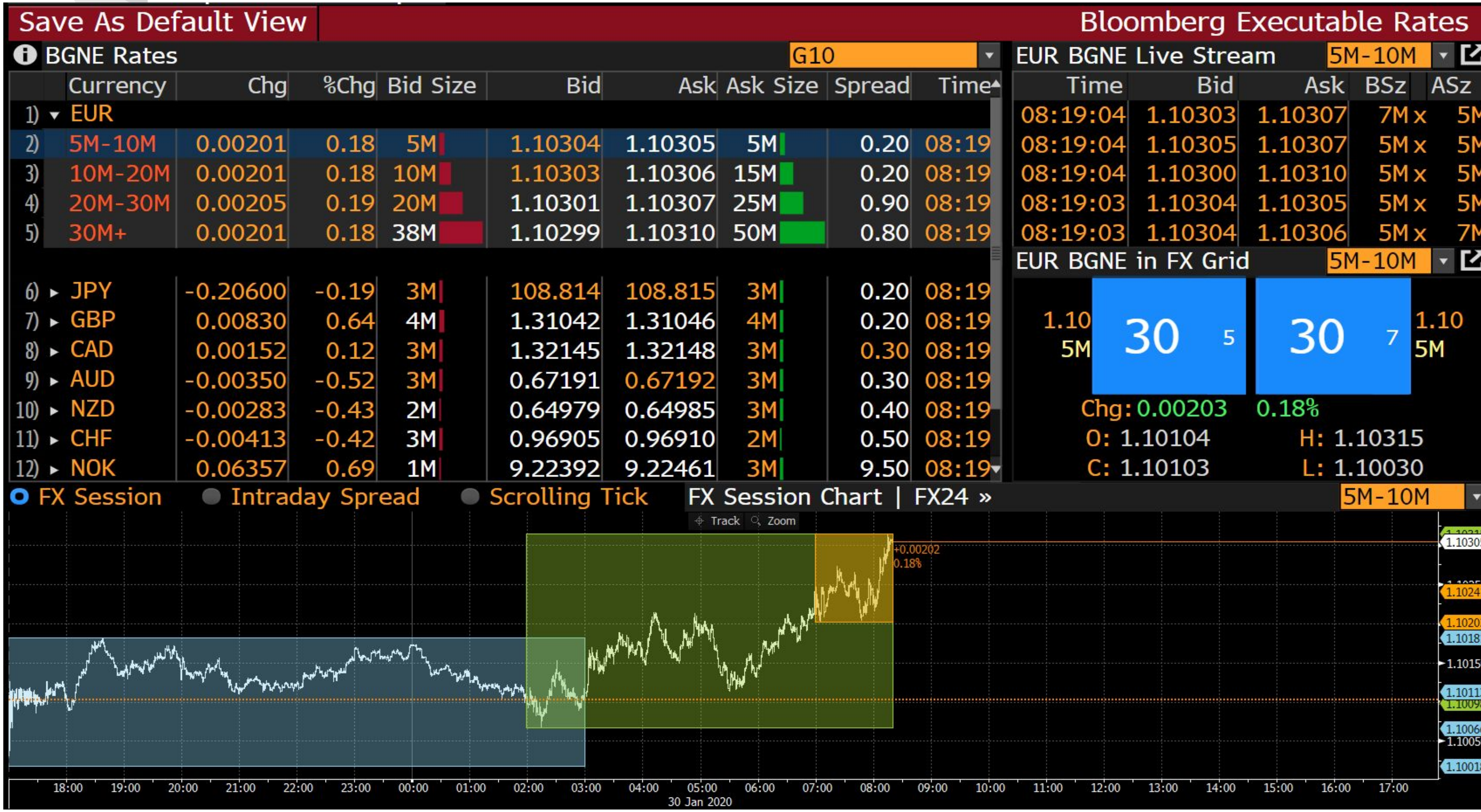
- Foreign Exchange
- Gold
- Oil

Foreign Exchange Spot

- The purchase or sale of one currency in exchange for another.

- Typically:
  - to be available in two days.
  - involves physical delivery.

Foreign Exchange Quotes - Underlying



Source: Bloomberg LP

A Foreign Exchange Forward or an Outright forward

- Is a contract, typically between two institutions, that locks in the exchange rate for the purchase or sale of a currency in exchange for another currency at a future date.
- There is no exchange of funds at inception.
- Usually has physical delivery but may "cash settle"

Forwards

Are contracts, typically between two institutions, to buy or sell a specific amount of an underlying against another at a specific rate on or before a specific date.

Some Terminology

- The party that bought has a long position
- The party that sold has short position

Think about this:
How does the FX terminology confuse? How is it analogous when buying stock, can you reconcile the discrepancy?

An FX Forward why do a Forward instead of Spot

- On December 11, 2019 a trader at a hedge fund thinks the British pound has been oversold as a result of the BREXIT impasse and wants to go long British Pounds over the next six months.

- She buys £1 million in six months at an exchange rate of \$1.3010/£. Spot is \$1.2940/£

Think about this:

- What just happened?
- What does 1.3010 mean and why didn't she buy spot?
- What happens in six months?

Profit from a Long Forward Position

(ATMF = delivery price = market neutral forward price at time contract is initiated)

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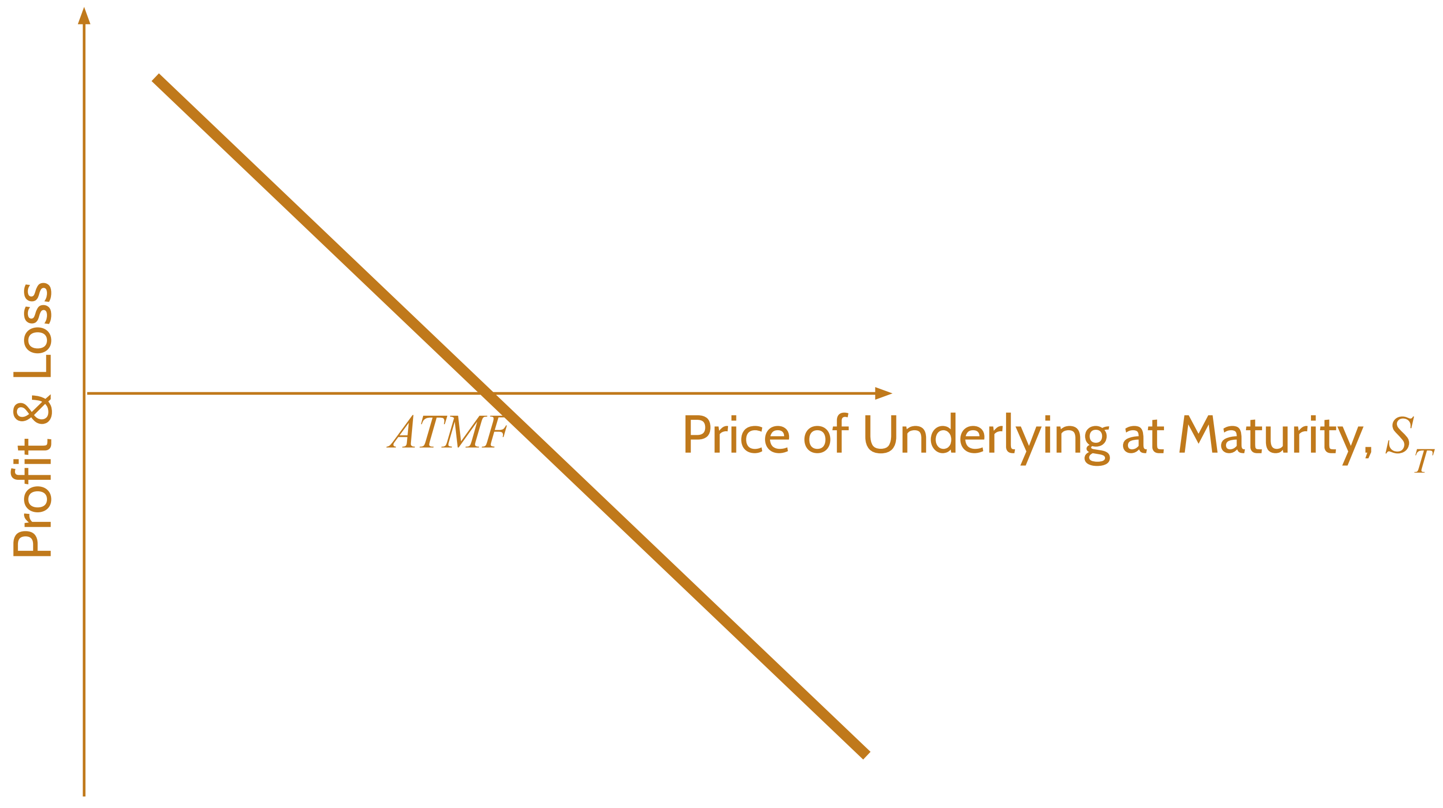


Futures vs Forward Contracts

- Futures like forwards, are financial contracts
- However:
  - Futures contracts are standardized whereas
  - Forward contracts are privately negotiated
  - Futures are traded on an exchanges that clear whereas
  - Forwards are traded over-the-counter
  - Futures require margin whereas
  - Forwards typically do not
  - Futures typically have a lower credit risk

Exchanges Trading Futures

- CME Group (formerly Chicago Mercantile Exchange & Chicago Board of Trade)
- NYSE Euronext
- BM&F (Sao Paulo, Brazil)
- TIFFE (Tokyo Financial Exchange)
- LIFFE (London Int'l Financial Futures & Options)
- LME (London Metal Exchange)
- and many many more

Gold futures on CME Group

Look at all that you need to consider: at: https://www.cmegroup.com/trading/metals/precious/gold.html

Gold Futures Contract Specs

View Another Product

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

Futures | Options

Contract Unit	100 troy ounces	
Price Quotation	U.S. dollars and cents per troy ounce	
Trading Hours	CME Globex:	Sunday - Friday 6:00 p.m. - 5:00 p.m. (5:00 p.m. - 4:00 p.m. /CT) with a 60-minute break each day beginning at 5:00 p.m. (4:00 p.m. CT) TAS: Sun-Fri 6:00 p.m. - 1:30 p.m. ET (5:00 - 12:30 CT) TAM: Asia: Sun - Frid 6:00 p.m. ET - 3:30 p.m. China London a.m.: Sun-Fri 6:00 p.m. ET - 10:32 a.m. London London p.m.: Sun-Fri 6:00 p.m. ET - 3:02 p.m. London
	CME ClearPort:	Sunday - Friday 6:00 p.m. - 5:00 p.m. (5:00 p.m. - 4:00 p.m. /CT) with a 60-minute break each day beginning at 5:00 p.m. (4:00 p.m. CT)
Minimum Price Fluctuation	Outright: 0.10 per troy ounce = $10.00 TAS/TAM: Zero or +/- 10 ticks in the minimum tick increment of the outright	
Product Code	CME Globex: GC CME ClearPort: GC Clearing: GC TAS: GCT TAM: GCD	
Listed Contracts	Monthly contracts listed for 3 consecutive months and any February, April, August, and October in the nearest 23 months and any June and December in the nearest 72 months	
Settlement Method	Deliverable	
Termination Of Trading	Trading terminates at 12:30 p.m. CT on the third last business day of the contract month.	
Trade At Marker Or Trade At	Trading at Settlement (TAS) is subject to the requirements of Rule 524.A. TAS trades off a "Base Price" of zero (equal to the daily settlement price) to create a differential versus the	

Source: CME

Example of Futures Contracts

Look at all that you need to consider:
at:https://www.lme.com/en-GB/Metals/Precious-metals/LME-Gold#tabIndex=4

- Contract code: AU
- Underlying material: Loco London Fine Gold held in London and complying with standards relating to good delivery and fineness acceptable to the Precious Metal Clearer of the Clearing House for the purpose of effecting settlement with the Clearing House, as such standards are in effect from time to time.
- Lot size: 100 fine troy ounces
- Price quotation: US dollars and cents per fine troy ounce
- Clearable currencies: US dollars
- Trading venues: LME
- Trading hours: 01:00 – 20:00 London time
- Daily Dates tradeable from T+1 to T+3, Monthly Dates for at least 24 months (third Wednesday Prompt) and for a further twelve Calendar Quarterly Dates, as defined in the LME Rulebook
- etc...

Source: LME

Example of Futures Contracts

Data valid for 28 August 2020

LME GOLD CLOSING PRICES, US$ PER FINE TROY OUNCE

CONTRACT	PRICE
SPOT	1965.90
Month 1	1966.20
Month 6	1969.90
Month 12	1973.30
Month 24	1969.20

Source: LME

LME Gold Spot vs 12 month
Free money?

Aug 31, 2020:

- Spot price of gold is $1,965
- 1-year forward price of gold is $1,973

- The 1-year US$ interest rate is 0.41% per annum

- ***What would a speculator, who thinks Gold will rise a lot in the next 12 months do?***
- ***What will Barrick Gold Corp do. It estimates that in 2020 it will mine 6 million ounces of Gold.***
- ***Tudor Group is thinking of buying spot at $1,965 and selling gold 12 months out at $1,973. Is it a good idea?***

Forward Price Calculation

- For Gold: $F_{Gold} = S\,(1+r\,)^{t}$ (ignore lease rate)

$1,965 * (1.0041)= $1,973
assuming: no cost of carry & no leasing

Can you calculate the right 1 year forward gold price?

Forward Price Calculation

- For Foreign Exchange, the forward rate in EURUSD:

$$F_{Euro} = S \times (1 + r^d) / (1 + r^f)$$

Spot: \$1.1945/€ US Rates: 0.41%   European Rates: -0.41%

Where:

S = spot rate

r= domestic risk free interest rate

r^d= Domestic - US\$ one-year interest rate

r^f= Foreign - € one-year interest rate

- ***What is the one year EURUSD forward rate***

Oil Futures: Different Considerations

CLH0 COMB Comdty | Page 1/2 Security Description

1) Contract Information | 2) Linked Instruments

CLH0 Comdty | WTI CRUDE FUTURE Mar20 | NYM-New York Mercantile Exchange

3) Notes

** Product specifications link below **
Crude Oil Futures
**Effective July 6, 2015 and pending all relevant CFTC regulatory review periods, CME will close

4) Contracts | CT » Jan-F Feb-G Mar-H Apr-J May-K Jun-M Jul-N Aug-Q Sep-U Oct-V Nov-X Dec-Z

Contract Specifications

Contract Size	1,000 Barrels
Value of 1.0 pt	$ 1,000
Tick Size	0.01
Tick Value	$ 10
Price 52.05	USD/bbl.
Contract Value	$ 52,050
Last Time	07:55:23
Exch Symbol	CL
FIGI	BBG007J6GK99

Daily Price Limits

Up Limit	N.A.
Down Limit	N.A.

Trading Hours

Exchange | Local

Electronic	18:00 - 17:00

6) Related Dates | EXS »

First Trade	Fri	11/21/2014
Last Trade	Thu	02/20/2020
First Notice	Mon	02/24/2020
First Delivery	Sun	03/01/2020
Last Delivery	Tue	03/31/2020

7) Holidays | CDR NM »

5) Price Chart | GP »

Intraday History Curve

Prc Chg 1D	-1.28/-2.4%
Lifetime High	80.95
Lifetime Low	43.43

Margin Requirements

	Speculator	Hedger
Initial	3,850	3,500
Secondary	3,500	3,500

Source: Bloomberg LP

Mar Contract expires 3/31 must be delivered at some point in March

Oil Futures: Different Considerations

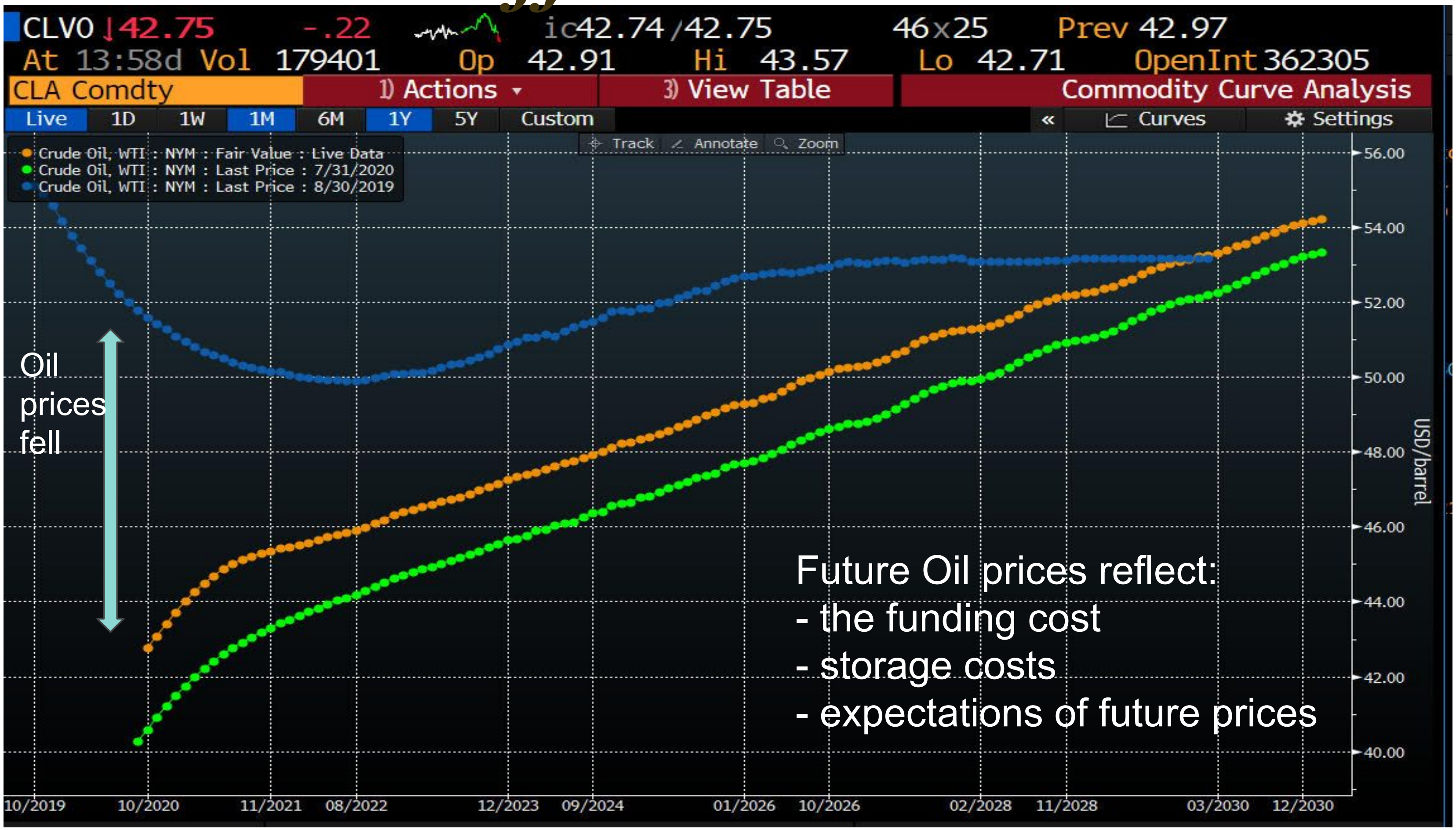
Crude Americas | Crude Europe | OSP Middle East | OSP Others | Product Light Ends | Middle Distillates | Fuel Oil

	Time	Price	Chg	Diff	Chg
United States					
Alaska North Slope	01/29	60.58	-.40	7.25	-.25
Bakken UHC	01/29	47.83	-.15	-5.50	.00
Bakken Guernsey	01/29	50.83	.35	-2.50	.50
Bloomberg USGC Sour Inc	01/29	54.08	-.20	.75	-.05
Bonito Sour	01/29	56.08	.15	2.75	.30
Cal Merc Avg (CMA) Diff	01/29			-.07	-.03
Magellan East Houston	01/29	56.78	-.05	3.45	.10
Heavy Louisiana Sweet (H	01/29	56.33	-.70	3.00	-.55
Light Louisiana Sweet (LL	01/29	57.33	.05	4.00	.20
Mars Blend	01/29	54.43	-.25	1.10	-.10
Poseidon	01/29	53.33	-.20		
Southern Green	01/29	54.48	-.15	1.15	.00
Thunder Horse	01/29	56.13	-.15	2.80	.00
WTI Cushing	01/29	53.33	-.15		
WTI Midland	01/29	54.13	-.15	.80	.00
WTI Posting Plus Diff	01/29			3.31	-.03
West Texas Sour (WTS)	01/29	53.63	-.10	.30	.05
NYMCL Full Month	07:57	57.55	-.09	57.55	-.09
ICECO Full Month	07:56	63.63	-.14	63.63	-.14
Colombia					
Vasconia	01/29	54.99	-.18	-3.75	.00
Ecuador					
Oriente	01/29	53.99	-.18	-4.75	.00

	Time	Price	Chg	Diff	Chg
Canada					
Edmonton Syncrude Swe	01/29	49.61	.02	-3.50	.50
Edmonton Mixed Sweet	01/29	45.26	.92	-7.85	1.40
Edmonton C5 Condensat	01/29	51.11	-.23	-2.00	.25
West Canada Select (WC	01/29	32.86	2.02	-20.25	2.50
Implied Bitumen	01/29	25.04	2.99	-28.29	3.14
Mexico					
Mexican Mix	01/29	49.86	.27		
Isthmus					
to Europe	02/29			-5.65	
to Asia	02/29			-1.50	
to USA	02/29			-5.75	
to USA (Bloomberg)	01/29	53.38	-.04		
Maya					
to Europe	02/29			-11.35	
to Asia	02/29			-6.80	
to USA	02/29			-8.05	
to USA (Bloomberg)	01/29	49.78	-.04		
Olmeca					
to USA	02/29			-.35	
to USA (Bloomberg)	01/29			55.83	-.04
to Europe	02/29			-1.35	
Venezuela					
Venezuela Basket	01/24	55.59			

Source: Bloomberg LP

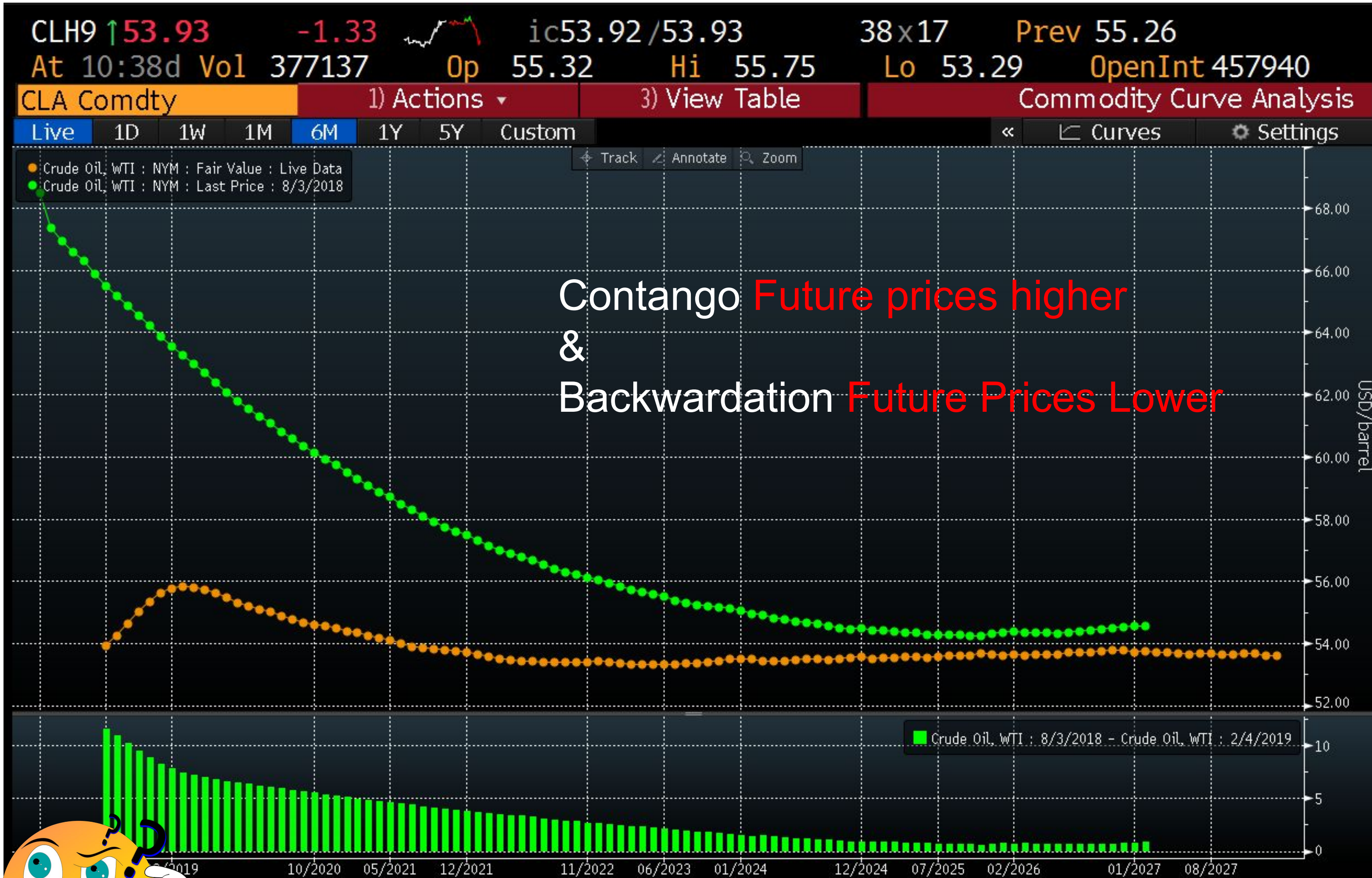
Oil Futures: Different Considerations



Source: Bloomberg LP

- ***Blue line the price in Aug2019 vs today's orange line. Why isn't the change consistent across all generic maturities?***

Oil Futures: Different Considerations



- *Green line is six months ago and in BACKWARDATION vs today's why?*

Source: Bloomberg LP

Other Important Futures Markets:

- EURODOLLAR
  - U.S. dollar-denominated deposits at non-US located banks.
  - EuroDollar futures are derivatives on the interest rate paid on deposits not subject to US jurisdiction.
  - Eurodollar futures are “cash settled”
  - Eurodollar futures allow market participants to lock or speculate on the direction of interest rates

- T-Bonds
  - Treasury futures are derivatives on specific Treasury securities. If one buys a Treasury future contract she agrees to take delivery of the underlying security at the price she went long.

- Stock Index futures
  - Stock index futures are “cash-settled” based on the value of the index.
  - Single Stock futures are not popular (were illegal for a long time - to prevent unfunded stock speculation)

Type of Funds

- Mutual Funds
- Hedge Funds

Mutual Funds must:

- disclose their investment policies,
- allow investors to redeem their investment at any time,
- not use excessive leverage
- no shorts

Hedge Funds :

- are not subject to mutual fund rules
- use complex trading strategies, very often derivatives
- invest or speculate in every conceivable asset class
- are a limited partnership of investors hoping to realize large gains.
- cannot offer their securities publicly

Sample Hedge Fund Investment

- Long/Short Equities
- Convertible Arbitrage
- Distressed Securities
- Emerging Markets
- Global macro
- Merger Arbitrage

Review:
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- However:
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  - Futures are traded on an exchanges that clear whereas
  - Forwards are traded over-the-counter
  - Futures require margin whereas
  - Forwards typically do not but that is changing

  - Futures typically have a lower credit risk

Review: How Derivatives are Used

- To Hedge exposures that arises from other economic activity
- To Speculate
- To take advantage of market dislocations (arbitrage)
- To change the maturity or risk profile of an exposure
- To change the payoff profile of an asset without having to sell it

Review: Forward Price Calculation

Calculating the forward rate:

Forward rate =
- borrow money to buy at spot +
- pay interest on the money you borrowed +
- incur other costs/benefits to owning the asset.

Review: Type of Traders

- Hedgers
- Speculators
- Arbitrageurs
- Any combination