IVolatility US Historical Intraday Future Options Data Guide

Overview of US Historical Intraday Future Options Data

Intraday futures and future options data provide a variety of trading possibilities, opening the gates to a market's microstructure. Professionals use this data for high-frequency-trading (ALGO trading), traders use it for engaging in intraday option strategies, and quants use it for developing new models for more accurate forecasting and predicting of volatility, or enhancing options pricing models, etc… backtesting strategies, applying custom analytics, analyzing intraday market performance and more.

The IVolatility Historical Intraday Futures Options Data consists of 1 minute data snapshots for all US future options (~400000 as of now) and future (~45000). Database consists of history since September 2019 and contains data updates for every new day.

Intraday data includes:

- Futures and future options quotes, including volumes, settlements and OI
- Options Implied Vols and Greeks
- Data frequency of snapshots: 1, 5, 15, 30, 60 minutes or any custom intervals/specific time snapshots during the day
- Implied Volatility Surface by Moneyness, IVIndex (coming soon)

Complimentary data include interest rates and contract specification details.

Intraday Options Database is built by the same team and based on the same methodology that created our award-winning End-Of-the-Day database used by the leading firms.

To order the data, contact us at sales@ivolatility.com or call +1-201-275-1111.

Population and cleansing

Based on 20 years' experience building and supporting the best-known end of the day Options Implied Volatility database, we developed the technology and methodology to capture, cleanse and calculate derived data on an intraday basis as well.

Since our goal is to provide accurate and reliable data timely, we do the following:

- Use well-regarded market data vendors. This is the first step to get accurate market information like price, dividends, volume, etc...
- Our dedicated team tracks all corporate events such as splits, mergers, spin-offs, distributions, etc applying any ticker changes to maintain equity history continuity.
- Our analysts manually verify the data for accuracy of dividend and prices based on our own proprietary filters.
- When calculating implied volatilities, proprietary algorithms automatically filter bad data and replacing with interpolated volatilities, avoiding occasional spikes.
- Use a combination of Black&Scholes and Binomial Tree 100 steps, providing accuracy for the implied volatilities and Greeks.
- Various algorithms allow us to control data capturing in real time.
- After markets close, we perform some additional reviews to check the integrity of data and apply corrections if required.
- We register all found gaps in a special table for future reference.
- Quality of our data was tested as well by our clients over 20 years.
- We deliver the final product - completely verified with corrected data.

Data Delivery of Intraday Future Options Data.

Historical intraday data are delivered either via FTPS/HTTPS or via media device (HDD).

Intraday data files are delivered via FTPS/HTTPS after 7pm EST (through a link).

The file structure is as follows:

For historical files:
<table>/<file_name>.csv.gz
where <table> - the name of the dataset (options, stocks),
<file_name> - the archive name is built according to the following 4 possibilities (it depends on an estimated data size to be processed and our current server setup/source pools):

a) <table>_xxx – used for small orders. It's usually applied for 'stocks' dataset;
b) <table>_<yyyy>_xxx;
c) <table>_<yyyy-mm>_xxx – the most widely used data breakdown type;
d) <table>_<yyyy-mm-dd>_xxx – used when the total size of the data is quite large;

where xxx is an archive's sequential number (000, 001, …, 999). The last archive (chunk) could be empty (20 bytes) while our engine splits minutes data, but it's not a mistake, it means that the rest of the data fit into a previous chunk. See examples below:

futures_2019_000.csv.gz,
fut_options_2019-08_000.csv.gz, fut_options_2019-08_001.csv.gz,…, fut_options_2019-08_004.csv.gz
fut_options_2019-05-01_000.csv.gz

HTTPS mode
A client receives the link going to the web user interface:
https://cloud.ivolatility.com/downloads/
Login = **login**
Password = **11 characters password** (special characters are also used)
It's easy to use and has clear folder hierarchy.

The average size for all US market per day with 1-minute data in archive is:

- Raw IV (Future options prices + IV&Greeks) - 8GB
- NBBO – 5GB
- Future Prices – 250Mb.

Size per each equity per day with 1-minute data in archive is:

- Raw IV (Future options prices + IV&Greeks) – for CL Mb (largest size), for others in average 450-500Mb
- NBBO – 200-250Mb
- Futures Prices – 1Mb.

Uncompressed data is 6-7 times larger.

Intraday Data files description.

The intraday historical database contains 1-minute market snapshot of each data type (Raw IV, IVindex, IVSurface) since September 2019.

Data is divided into two groups: historical intraday tables and auxiliary EOD (end of the day) tables.

Intraday historical tables: Futures, Future options, IV_Index and IV_Surface (coming soon). These tables and files are captured during each trading day with 1-minute frequency. The process is organized so the futures and future options prices used for calculations are taken simultaneously.

Below is a description of all tables. Depending on the dataset choice, the set of tables will correspond to the selected dataset (i.e. dataset IVIndex includes IVIndex table only + end of the day auxiliary tables).

Intraday data tables/files

These are high frequency intraday data containing a market snapshot with the required frequency and are available in the intraday update service during the trading day.

Futures Price (Futures)

This table includes intraday historical prices of futures (bid/ask, volume, OI, settlements).

Prices (bid, ask, open, etc.) are fixed depending on the exchange from the pit or electronic floor (can be determined by the exchange identifier in the futures symbol, for example, ".NXG" means that the quote from the electronic floor of the NXG exchange, and .NX "- respectively from the pit).

Settlements and OI are updated once a day by each exchange at its specific time.

Column	Type	Comment	Example
t_date	timestamp	t_date as is in the names of files and folders	2019-07-03 03:08:00
underlying_symbol	string	Symbol of the futures underlying root	CL
future_symbol	string	Symbol of the future	CL/19Q.NXG
expiration_date	timestamp	Expiration date of the future	2019-07-22
price_bid	float	Bid price	56.1
price_ask	float	Ask price	56.16
price_last	float	Last trade price	56.1
date_bid	timestamp	Time of bid quote	2019-07-03 03:07:01
date_ask	timestamp	Time of ask quote	2019-07-03 03:07:09
date_last	timestamp	Time of last trade	2019-07-03 03:01:04
size_bid	int	Bid size	2
size_ask	int	Ask size	1
size_last	int	Last trade size	1

open	float	The open price achieved at the start of current trading day	56.0
price_high	float	The highest price achieved during the current trading day	56.2
price_low	float	The lowest price achieved during the current trading day	56.0
price_close	float	The last price achieved at the end of the most recent trading day	56.1
settlement	float	Settlement price of the future	56.1
settlement_date	timestamp	Settlement date of the future	2019-07-03 18:56:00
volume	int	Cumulative volume of the future (the sum of trade sizes for all trades reported to date)	27
open_interest	int	Open interest of the future	34
cumulative_value	float	Cumulative value of the future (the sum of (trade * size) for all trades reported to date)	2934.8
cumulative_price	float	Cumulative price of the future (the sum of trades for all trades reported to date)	2628.86
calc_date	timestamp	Date and time of last changing of the particular row. It is used to track changes (recalculations) in data over time (technical field)	2019-07-03 03:07:00
dt	timestamp	Date and time of data snapshots.	2019-07-03 03:08:00

Raw IV (Future options)

Individual future options contract data (bid/ask, volume, OI, settlements) along with implied volatility and Greeks. This table includes all traded expirations and strikes: regular options expired on 3rd Friday/Saturday, weeklies, quarterlies, short-terms, mid-curve and daily options.

Prices (bid, ask, open, etc.) are fixed depending on the exchange from the pit or electronic floor (can be determined by the exchange identifier in the futures symbol, for example, ".NXG" means that the quote from the electronic floor of the NXG exchange, and .NX "- respectively from the pit).

Settlements and OI are updated once a day by each exchange at its specific time.

If only options price data is requested, then the IV & Greeks columns will be excluded.

Column	Type	Comment	Example
t_date	timestamp	t_date as is in the names of files and folders	2019-07-03 03:08:00
future_root_symbol	string	Symbol of the futures underlying root	CL
future_symbol	string	Symbol of the future	CL/19Q.NXG
option_symbol	string	Symbol of the futures option	CL/19Q/5000P.NXG
expiration_date	timestamp	Expiration date of the futures option	2019-07-20
strike	float	Strike price of the futures option	50
call_put	string	Option type (call or put)	P
style	string	Option style (Europe (E) or American (A))	A
underlying_price	float	Last price of the underlying future	61.57
price_bid	float	Bid price	56.1

price_ask	float	Ask price	56.16
price_last	float	Last trade price	56.1
date_bid	timestamp	Time of bid quote	2019-07-03 03:07:01
date_ask	timestamp	Time of ask quote	2019-07-03 03:07:09
date_last	timestamp	Time of last trade	2019-07-03 03:01:04
size_bid	int	Bid size	2
size_ask	int	Ask size	1
size_last	int	Last trade size	1
open	float	The open price achieved at the start of current trading day	1.93
price_high	float	The highest price achieved during the current trading day	2.01
price_low	float	The lowest price achieved during the current trading day	1.90
price_close	float	The last price achieved at the end of the most recent trading day	1.98
settlement	float	Settlement price of the futures option (updated by each exchange once a day at a specific time)	1.98
settlement_date	timestamp	Date of the futures option settlement price	2019-06-03 18:56:07
volume	int	Cumulative volume of the futures option (the sum of trade sizes for all trades reported to date)	51
open_interest	int	Open interest of the futures option (updated by each exchange once a day at a specific time)	13
cumulative_value	float	Cumulative value (the sum of (trade * size) for all trades reported to date)	2.29
cumulative_price	float	Cumulative price of the futures option (the sum of trades for all trades reported to date)	2.29
iv	float	Implied volatility is equal to pre_iv (see below) in cases where it was calculated or interpolated linearly between strikes and linearly by variance between expirations for missing points based on pre_iv	0.6538
delta		Delta	0.00228
gamma		Gamma	0.000442
theta		Theta	-0.000747
vega		Vega	0.00176
rho		Rho	0
pre_iv		implied volatility calculated directly from option price, if volatility is not calculated it is set to “-1”	0.6538
calc_date	timestamp	Date and time of last changing of the particular row. It is used to track changes (recalculations) in data over time (technical field)	2019-07-03 03:05:23
dt	timestamp	Date of data snapshots.	2019-07-03 03:08:00

Futures IV Surface (coming soon)

Implied Volatility Surface (normalized by maturities and moneyness implied volatility for underlying)

Column	Type	Comment	Example
t_date	timestamp	t_date as is in the names of files and folders	2019-07-03 03:08:00
root_symbol	string	Symbol of the futures underlying root	CL
term	int	Virtual expiry in calendar days (7, 14, 21, 30, 60, 90, 120, 150, 180, 270, 360, 720, 1080)	30
otm	int	Out-of-the-moneyness (wrt of underlying futures price)	40
call_put	string	Option type (call or put)	C
iv	float	Implied volatility of a virtual contract	0.21067
delta	float	Delta of a virtual contract	0
calc_date	timestamp	Date and time of last changing of the particular row. It is used to track changes (recalculations) in data over time (technical field)	2019-07-03 03:07:00
dt	timestamp	Date and time of data snapshots.	2019-07-03 03:08:00

Futures IV Index (coming soon)

Implied Volatility Index (averaged implied volatility for underlying);

Column	Type	Comment	Example
t_date	timestamp	t_date as is in the names of files and folders	2019-07-03 03:08:00
root_symbol	string	Symbol of the futures underlying root	CL
term	int	Virtual expiry in calendar days (7, 14, 21, 30, 60, 90, 120, 150, 180, 270, 360, 720, 1080)	30
call_put	string	Option type (call or put)	C
ivx_call	float	IV Index Call	0.5459955
ivx_put	float	IV Index Put	0.5494843
calc_date	timestamp	Date and time of last changing of the particular row. It is used to track changes (recalculations) in data over time (technical field)	2019-07-03 03:07:00
dt	timestamp	Date and time of data snapshots.	2019-07-03 03:08:00

Column “calc_date” is a column which contains an exact time when an entry had been changed/recalculated, there are situations when “t_date” time (and times of bid and ask prices for an option) differs from “calc_date” one. It’s not an error, such behavior occurs due to the calculation time needed to process the whole market and post results. So “t_date“ can be greater than “calc_date“ even by one or two minutes (especially for old data).

End of the day data/files

End of the day tables are updated in the evenings right after **Futures** market is open.

InterestRates

We use interpolated interbank offered rates such as LIBORs with 1 day delay.

Column	Type	Comment
dt	string	Trade date in format yyyy-mm-dd
currency	string	Currency code
period	int	Period in trading days. Standard periods are 30, 60, 90, 120, 150, 180, 210, 240, 270, 300, 330, 360, 720, 1080, 1440, 1800. Rates for other periods are interpolated
rate	float	Interest rate % value
calc_date	timestamp	Date and time of last changing of the particular row. It is used to track changes (recalculations) in data over time (technical field)

Underlyings

Underlying information.

Column	Type	Comment
symbol	string	Future underlying symbol
name	string	Future underlying contract name
currency	string	Future underlying currency
exchange	string	Future underlying exchange short symbol
exchange_name	string	Future underlying exchange name
group_name	string	Future underlying group (Commodity, Agricultural, Energy etc.)
measure	string	Future underlying measure (BUSHELS, BARRELS, KILOS etc.)
mesure_currency	string	Mesure currency
contract_size	float	Size of the futures contract
minimum_tick	float	Minimum futures price step
t_date	timestamp	Start date of the period where this record is valid
term_date	timestamp	End date of the period where this record is valid
calc_date	timestamp	Date and time of last changing of the particular row. It is used to track changes (recalculations) in data over time (technical field)

Futures

Instrument information (symbol, expiration date) and change history.

Column	Type	Comment
symbol	string	Future underlying symbol
name	string	Future underlying contract name
future_symbol	string	Future contract symbol
contract_month	string	Future contract expiration month
month_code	string	Future contract expiration month code
expiration_date	timestamp	Future expiration date
t_date	timestamp	Start date of the period where this record is valid
term_date	timestamp	End date of the period where this record is valid
calc_date	timestamp	Date and time of last changing of the particular row. It is used to track changes (recalculations) in data over time (technical field)

OptionRoots

Futures options classes (roots) description data.

column	Type	comment
symbol	string	Future underlying symbol
name	string	Future underlying contract name
option_root	string	Future options root symbol
style	string	Future options root style
close_time	time	Close time
settlement_time	time	Close time at expiration
product_name	string	Future options type (short description)
t_date	timestamp	Start date of the period where this record is valid
term_date	timestamp	End date of the period where this record is valid

Our clients

20 years working and constantly developing data resulted in more than 70,000 clients from all over the world using **IVolatility.com** trading and risk management systems for US, European and Asian market data and analytics.

IVolatility.com clients represent all segments of the global derivatives market. More than half of the top 30 options market makers and US options brokers use **IVolatility.com** financial data services. In addition, **IVolatility.com** clients include 3 out of 5 of the largest US banking institutions and more than half of the top 50 investment banks. Other important clients include the CBOE, the NYSE, RiskMetrics Group - a proven leader in risk management, corporate governance, financial research and analysis- along with the Options Clearing Corporation, as well as hundreds of investment and hedge funds.