IVolatility US Historical Intraday Options Data Guide

Overview of US Historical Intraday Options Data

Intraday stock and options data provides a variety of trading possibilities opening the gates to a market's microstructure. Professionals use these data for high-frequency-trading (ALGO trading), traders for engaging in intraday option strategies and quants - 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 Options Data consists of 1 minute data snapshots for all US options (700,000+ as of now) and indexes and equities (5000+). Database includes history since August 2011 and comes with data updates for new day.

One minute snapshots are available for the following data:

- Equities and options quotes
- Options' Volumes and OI
- Options Implied Vols and Greeks
- Coming soon: Implied Volatility Surface by Moneyness, IVIndex

Complimentary data such as dividends, rates, corporate actions are included as well.

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 15 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 15 years.
- We deliver the final product - completely verified with corrected data.

Data Delivery of Intraday Options Data.

Compressed CSV file delivery:

Historical intraday data are delivered either via SFTP (for small orders) or via media device (HDD).

Intraday update data files are delivered either via SFTP or to SFTP.

By default, historical data are delivered in following file structure hierarchy archived in gzip:

<table>/dt=<yyyy-MM-dd>/<file_name>.csv.gz

where <table> - the name of the dataset (options, stocks, iv_index, iv_surface etc.),
<yyyy-MM-dd> - trading date,
<file_name> - the file name in the format <table>_<current_stock_symbol>_<stock_id>_<date>

The average size for all US market per day with 1-minute data in archive is:
- Raw IV (Options prices + IV&Greeks) - 2.4GB,
- Stock Prices – 40Mb.

The average size per each stock per day with 1-minute data in archive is:
- Raw IV (Options prices + IV&Greeks) – 0.6 MB,
- Stock Prices – 10Kb.

Intraday Data files description.

The intraday historical database contains 1-minute market snapshot of each data type (Raw IV, IVindex, IVSurface) beginning 8/22/2011. There are 410 records (minutes) during each trading date (9:30 AM – 16:19 PM EST).

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

Intraday historical tables: Stocks, Options, IV_Index and IV_Surface. These tables and files are captured during each trading day with 1-minute frequency. The process of taking market data for all US equities and options, further calculations of IV, Greeks, IVIndex and Surface and placing these data into the database and files takes exactly 1 minute. The process is organized so stock and options prices used for calculations are taken simultaneously.

End of the day tables are: Dividends, Split, Yield, Interest Rate, etc.

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).

The stock ID in many tables is an internal IVolatility equity identifier used as a key to link the data/tables. This field allows tracking corporate actions like stock renaming – the stock ID remains the same while the stock symbol could change.

Intraday data tables/files

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

Stock Price (Stocks)

This table includes intraday historical prices of stocks, indexes and ETFs for the requested frequency. Prices are not adjusted for splits and dividends. Information about all corporate actions is available in a separate end of the day tables (Splits, CorpActions).

Column	Type	Comment	Example
t_date	timestamp	t_date as is in the names of files and folders (for example 2013-07-02 16:00:00)	1/29/2015 15:26:00
stock_id	int	Internal stock identifier.	18155
symbol	string	Symbol of the security	VIX
type	string	Type of the security(S – stock, F – ETF, I – index)	I
currency	string	Currency of trading	USD
price_bid	float	Bid price	0

price_ask	float	Ask price	0
price_last	float	Last trade price	18.97
date_bid	timestamp	Time of bid quote	1/29/2015 00:00:00
date_ask	timestamp	Time of ask quote	1/29/2015 00:00:00
date_last	timestamp	Time of last trade	1/29/2015 15:24:31
size_bid	int	Bid size	0
size_ask	int	Ask size	0
size_last	int	Last trade size	0
exchange_bid	string	Bid exchange	*
exchange_ask	string	Ask exchange	*
exchange_last	string	Last exchange	*
volume	int	Volume	0
dump_time	timestamp	Date and time of data snapshots.	1/29/2015 15:24:57
calc_date	timestamp	Date and time of the last changing of the row (for example 2013-07-02 15:18:00)	1/29/2015 15:26:00

Column "dump_time" is filled only since 2/21/2014.

Raw IV (Options)

Individual option contract data (bid/ask, volume) along with implied volatility and Greeks. This table includes all traded expirations and strikes: regular options expired on 3rd Friday/Saturday, weeklies, quarterlies, and leaps, except non-standard options issued after corporate actions.

If only options price data is requested then the IV & Greeks columns marked (*) will be excluded.

Column	**Type**	**Comment**	**Example**
t_date	timestamp	t_date as is in the names of files and folders (for example 2013-07-02 16:00:00)	1/29/2015 12:13:00
stock_id	int	Internal stock identifier.	9327
stock_symbol	string	Underlying symbol	SPX
expiration_date	timestamp	Expiration date.	3/13/2015
strike	float	Strike price	2275
call_put	string	Type(C – Call, P – Put)	P
style	string	Option style(A – American, E – European)	E
symbol	string	Option symbol	SPXW 150313P02275000
price_bid	float	Bid price	275
price_ask	float	Ask price	278.7

date_bid	timestamp	Bid time	1/29/2015 12:11:31
date_ask	timestamp	Ask time	1/29/2015 12:11:31
size_bid	int	Bid size	100
size_ask	int	Ask size	101
exchange_bid	string	Bid exchange	W
exchange_ask	string	Ask exchange	W
volume	int	Option Volume	0
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	0.2085
price_opt	float	Underlying price used in calculations, this price is synchronized with options bid/ask prices.	2004.6
delta*	float	Delta	-0.95853
gamma*	float	Gamma	0.000589
theta*	float	Theta	-0.235246
vega*	float	Vega	0.58266
rho*	float	Rho	-2.59741
pre_iv*	float	implied volatility calculated directly from option price, if volatility is not calculated it is set to "-1"	0.2085
implied_yield*	float	Implied yield calculated during the trading day. All ETFs are calculated by implied yield from 1/2/2014.	
dump_time	timestamp	Date and time of data snapshots	1/29/2015 12:12:46
calc_date	timestamp	Date and time of the last changing of the row (for example 2013-07-02 15:18:00)	1/29/2015 12:13:00

Columns "price_opt" and "dump_time" are filled only since 2/21/2014. Column" implied_yield" currently is not filled.

Column "dump_time" is a column which contains an exact time when the data snapshot had been extracted, there are situations when "t_date" time (and times of bid and ask prices for an option) differs from "dump_time" one. It's not an error, such behavior occurs due to the calculation time needed to process the whole market and write results. So "t_date" can be more than "dump_time" even on one or two minutes.

End of the day data/files

End of the tables are updated in the mornings before market is open. All of the tables except InterestRate and OptionsEOD are rewritten daily. InterestRate and OptionsEOD tables are only updated with new data daily.

Dividends

We keep regular dividend data in this table.

For US stocks and ETFs before 1/28/2014, we use periodical dividends in the form of date, amount and frequency for implied volatility calculations. After 1/28/2014, we use implied yield for all US ETFs. Vendors provide the data from the exchanges, or it comes directly from the companies. As for the dividend date and amount data we use either data from the last paid dividend or information about the next declared dividend.

Column	Type	Comment
stock_id	int	internal stock identifier
t_date	timestamp	start date of the period where this dividend record is valid
term_date	timestamp	end date of the period where this dividend record is valid
last_dividend_amount	float	dividend amount (in currency of underlyings)
last_dividend _date	timestamp	dividend ex-date
dividend_frequency	int	times per year (1 - annually, 2 - semiannually, 4 - quarterly, 12 - monthly)
calc_date	timestamp	Date and time of last changing of the particular row. It is used to track changes (recalculations) in data over time.

Splits

Splits and irregular dividends data,

column	Type	comment
t_date	timestamp	split ex-date
stock_id	int	internal stock identifier
cause	int	0 - split, 1 - irregular cash dividend, 2 - stock dividend
factor	float	split factor (1.5 for 3:2 split etc.)
amount	float	dividend amount in $ per share (for cause = 1 only)
status	int	Status of data (0 – Not adjusted yet, 1- Adjusted, -1 - Suspected price, not adjusted, -2 - Invalid amount or factor, not adjusted)
calc_date	timestamp	Date and time of last changing of the particular row. It is used to track changes (recalculations) in data over time.

Yield

Stock indexes yield are the Average 12 month dividend and used in implied volatility calculations for the indexes.

Column	Type	Comment
t_date	timestamp	trading date the data is as of

stock_id	int	internal stock identifier
yield	float	yield
calc_date	timestamp	Date and time of last changing of the particular row. It is used to track changes (recalculations) in data over time. (calc_date>t_date for records containing fixes in history)

Interest Rates

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.

Contract Specifications

The table information content for open, close time, time at expiration is used to calculate last trading time together with Shift in OptioinsEOD table.

Column	Type	Comment
contractspecid	int	internal identifier
OpenTime	timestamp	open time on common trading day
CloseTime	timestamp	close time on common trading day
SettlementTimeAtExpiration	timestamp	close time at expiration
Description	string	Description

Stock

Base underlying instrument (stock, ETF, index) and Corporate Actions information (IPO, delisting).

Column	Type	Comment
stock_id	int	internal stock identifier
region_id	int	region identifier (currently only 1-USA)
currency	string	currency code
type	string	'S' - stock, 'I' - index, 'F' – ETF, 'X' – FX Index
create_date	timestamp	IPO date (the date we've "opened" the stock in our database - might not be the same as the actual IPO)

term_date	timestamp	instrument delist date (or date when we've "closed" the stock in our database)
ca_date	timestamp	last corporate action date

Stock Symbol

Instrument information (ticker, company name) and change history.

Column	Type	Comment
stock_id	int	internal stock identifier
t_date	timestamp	start date of the period where this record is valid
symbol	string	stock symbol
name	string	company name
exchange_id	int	internal exchange identifier
actiontype	string	corporate action type
term_date	timestamp	end date of the period where this record is valid
calc_date	timestamp	calculation date – technical field

CorpActions

Corporate actions information.

Column	Type	Comment
ex_date	timestamp	date when corporate action happened
stock_id	int	internal identifier of stock
actiontype	string	internal corporate action identifier

CorpActionType

Corporate action code/description information.

Column	Type	Comment
actiontype	string	internal corporate action identifier
description	string	corporate action description (split, merger, stock dividend, etc…)

RootProperty

Option classes (roots) description data.

column	Type	comment
root_id	Int	internal root identifier
t_date	timestamp	start date of the period where this record is valid

stock_id	int	internal stock identifier
symbol	string	root symbol
exchange_id	int	internal exchange identifier
actionType	string	internal corporate action identifier
IsEnabled	int	whether a root is standard (IsEnabled=0) or non-standard IsEnable=0)
term_date	timestamp	end date of the period where this record is valid
contractspecid	int	internal identifier (reference to the table "ContractSpec")
spc	float	shares per contract
multiplier	int	multiplier
cash	float	cash
calc_date	timestamp	calculation date – technical field

Exchanges

Exchange code/name data (reference table).

column	Type	comment
exchange_id	int	internal exchange identifier
code	string	exchange code
name	string	exchange name

Expirations

Information about expirations.

column	Type	comment
expiration_id	int	Internal expiration identifier
e_date	timestamp	real expiration date as it is in option dataset
exp_row	int	internal identifier of the expiration type. 1 – standard expiration (the 3rd Friday), 7 – VIX expirations, 8- quarterly expirations, 9 - weekly options and so on.
contract	string	symbol of the expiration
region_id	int	region identifier (currently only 1-USA)

Expiration Rules

Information about expiration types.

column	Type	comment
exp_row	int	internal identifier of the expiration type. 1 – standard expiration (the 3rd Friday), 7 – VIX expirations, 8-

		quarterly expirations, 9 - weekly options and so on.
name	string	Expiration type (standard, weekly,quaterly etc.)

OptionsEOD

Information about option volumes, open interest and other EOD option parameters.

column	Type	comment
dt	string	Trade date in format yyyy-mm-dd
stock_id	int	internal stock identifier (PARTITIONING)
symbol	string	Option symbol
expiration_date	timestamp	Expiration_date
expirations_id	int	Internal expirations identifier (reference to the table "Expirations"). Useful to filter out different types of expirations.
strike	float	Strike price
call_put	string	Type(C – Call, P – Put)
shift	int	shift of expiration date in days
openinterest	int	Open interest value
volumes	int	EOD options Volumes
calc_date	timestamp	calculation date (calc_date>t_date for records containing fixes in history)

QuoteExchanges

Contains information about data provider exchanges codes referring to exchange symbols in the StockPrice and Options tables.

column	Type	comment
exchange_symbol	string	Symbol of the exchange
name	string	Name of the exchange
mic	string	MIC code of the exchange

Our clients

15 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.