Introduction to Continuous Contracts

Individual futures contracts have fixed expiry months, and hence limited lifespans. To examine the price behavior of futures over longer historical time periods, it is necessary to combine these individual contracts. The combined histories are called "continuous futures contracts"; they are constructed by splicing together many individual futures contracts.

The Stevens Continuous Futures database is the definitive source for continuous price histories for 78 of the most heavily traded futures contracts. The database is updated daily at 3am US Eastern Time (excluding CBOE VX futures and MX SXF futures, which update next day around 11am EST), and includes historical data going back to the 1960s.

The Stevens Continuous Futures database provides unadjusted, ratio-adjusted, calendar-weighted, and panama-canal-shifted futures prices, concatenated using end-to-end, first-of-month, and open-interest-based roll dates. It is the most comprehensive source on the internet for high-quality continuous futures data, designed by and for specialist futures traders.

Stevens Continuous Futures Data

Stevens Continuous Futures is **the** most comprehensive and accurate source for historical continuous futures prices available anywhere on the internet. With the widest breadth of roll dates and price adjustments, and data that is triple-checked for accuracy, SCF offers a reliable, trust-worthy and cost-effective solution for futures traders and analysts. Our quality, consistency and comprehensiveness are second to none.

This page offers comprehensive documentation on the data included in the SCF database, including converage, construction methodology, nomenclatuer and more.

Splicing Methodology

There are two decisions to be made when splicing together individual futures contracts to create a continuous contract.

The first decision is **when to splice the contracts**. Different choices for the "roll date" correspond to different trading strategies for moving a position from one futures contract to the next. Roll date options include:

- on the last trading day of the expiring contract (end-to-end roll).
- on the first day of the contract delivery month or on the contract end date, whichever is sooner (terminal roll)
- on the first day that "back" contract has a higher open interest than the "front" contract (liquidity-based roll)

The second decision is **what price adjustment to make**, if any. Price adjustments are necessary to eliminate artificial jumps in the prices of consecutive futures contracts. Price adjustment choices include:

- no price adjustment
- forwards panama canal method (first true)
- backwards panama canal method (last true)
- backwards ratio method
- calendar-weighted method

The Stevens Continuous Futures database provides **all of these methods** for each and every futures contract covered. Further explanations of these adjustment methods can be found below under "Detailed Methodology".

Dataset Nomenclature

Quandl codes for datasets from the Stevens Continuous Futures database follow the format `SCF/{exchange}_{symbol}{number}_{method}` .

`{exchange}` refers to the futures exchange; it can take the values `CME` or `ICE` . (More exchanges will be added soon).

`{symbol}` refers to the ticker for the specific futures contract: for example, `CL` for Crude Oil, or `ED` for Eurodollar.

`{number}` refers to the "depth" of the continuous contract required. So, to get the first (front month) contract, you would use `1` .

`{method}` refers to the specific rule used to splice together the continuous contracts. There are 14 acceptable combinations of roll date and price adjustment, and so this parameter can take 14 possible values.

Contract List

The following table shows all the available futures contracts along with their corresponding exchanges. More contracts will be added soon.

Exchange	Symbol	Name
CBOE	VX	CBOE VIX Futures
CME	TY	CBOT 10-year US Treasury Note
CME	TU	CBOT 2-year US Treasury Note
CME	FF	CBOT 30-day Federal Funds
CME	US	CBOT 30-year US Treasury Bond
CME	FV	CBOT 5-year US Treasury Note
CME	C	CBOT Corn
CME	DJ	CBOT Dow Jones Ind Avg (DJIA)
CME	O	CBOT Oats
CME	RR	CBOT Rough Rice
CME	SM	CBOT Soybean Meal

Exchange	Symbol	Name
CME	BO	CBOT Soybean Oil
CME	S	CBOT Soybeans
CME	W	CBOT Wheat
CME	AD	CME Australian Dollar AUD
CME	BP	CME British Pound GBP
CME	CD	CME Canadian Dollar CAD
CME	DA	CME Class III Milk
CME	YM	CME E-mini Dow Jones
CME	EC	CME Euro FX
CME	ED	CME Eurodollar
CME	JY	CME Japanese Yen JPY
CME	KW	CME Kansas City Wheat
CME	LN	CME Lean Hogs
CME	LC	CME Live Cattle
CME	MP	CME Mexican Peso
CME	NQ	CME NASDAQ 100 Index Mini
CME	NE	CME New Zealand Dollar NZD
CME	NK	CME Nikkei 225
CME	LB	CME Random Length Lumber
CME	MD	CME S&P 400 Midcap Index
CME	SP	CME S&P 500 Index
CME	ES	CME S&P 500 Index E-Mini
CME	SF	CME Swiss Franc CHF
CME	HG	COMEX Copper

Exchange	Symbol	Name
EUREX	FDAX	EUREX DAX
EUREX	FESX	EUREX EURO STOXX 50 Index
EUREX	FBTP	EUREX Euro-BTP
EUREX	FGBM	EUREX Euro-Bobl
EUREX	FGBL	EUREX Euro-Bund
EUREX	FOAT	EUREX Euro-OAT
EUREX	FGBS	EUREX Euro-Schatz
ICE	B	ICE Brent Crude Oil
ICE	MP	ICE British Pound GBP
ICE	CC	ICE Cocoa
ICE	KC	ICE Coffee C
ICE	CT	ICE Cotton
ICE	G	ICE Gasoil
ICE	O	ICE Heating Oil
ICE	OJ	ICE Orange Juice
ICE	ATW	ICE Rotterdam Coal
ICE	RF	ICE Russell 1000 Index Mini
ICE	TF	ICE Russell 2000 Index Mini
ICE	SB	ICE Sugar No. 11
ICE	M	ICE UK Natural Gas
ICE	DX	ICE US Dollar Index
ICE	T	ICE WTI Crude Oil
LIFFE	I	LIFFE EURIBOR
LIFFE	Z	LIFFE FTSE 100 Index

Exchange	Symbol	Name
LIFFE	C	LIFFE London Cocoa
LIFFE	R	LIFFE Long Gilt
LIFFE	L	LIFFE Short Sterling
MGEX	MW	MGEX Hard Red Spring Wheat
MX	SXF	MX Montreal S&P/TSX 60 Index
CME	RB	NYMEX Gasoline
CME	GC	NYMEX Gold
CME	HO	NYMEX Heating Oil
CME	NG	NYMEX Natural Gas
CME	PA	NYMEX Palladium
CME	PL	NYMEX Platinum
CME	SI	NYMEX Silver
CME	CL	NYMEX WTI Crude Oil
SHFE	AL	SHFE Aluminium
SHFE	CU	SHFE Copper
SHFE	PB	SHFE Lead
SHFE	RU	SHFE Natural Rubber
SHFE	RB	SHFE Rebar
SHFE	ZN	SHFE Zinc

For a downloadable list of available futures contracts, along with useful metadata such as contract size, tick size, deliverable, expiry months, and historical depth, **please click here**.

Splice Codes

The following table shows the `{method}` codes associated with each roll date rule (across the columns) and each price adjustment rule (down the rows).

	Last Trading Day	First Day of Month	Open Interest Switch
Raw Prices	EN	FN	ON
Forwards Panama	EF	FF	OF
Backwards Panama	EB	FB	OB
Backwards Ratio	ER	FR	OR
Calendar-Weighted	EW	FW	*not available*

Column Headers

All futures datasets in the Stevens Continuous Futures database have the following column headers:

`Date, Open, High, Low, Settle, Volume, Prev Day OI` .

Note that Open Interest is always reported for the previous trading day. This is to avoid look-ahead bias: most exchanges do not publish definitive OI numbers until the day after trading.

Code Examples

Dataset	Quandl Code
Crude Oil, front month, roll on last trading date, no price adjustment	`SCF/CME_CL1_EN`
Corn, second contract, roll on first day of month, calendar-weighted	`SCF/CME_C2_FW`
Gold, first contract, roll on open interest switch, no price adjustment	`SCF/CME_GC1_ON`

For a downloadable list of all available continuous futures contracts in the SCF database, **please click here**.

Basic Usage

Datasets in the Stevens Continuous Futures database can be accessed using the same methods as all other data on Quandl. This includes website and browser views, downloads in any format, API use, libraries and Excel. Any function that you can carry out using free Quandl data, can also be carried out on SCF premium data.

The full SCF database is searchable from the Data tab on this page. Any individual dataset can be directly accessed from a browser using its Quandl code. For example, front-month Crude

Oil:www.quandl.com/SCF/CME_SI1_EN. The Metadata tab contains a list of all available Quandl codes from this database; you can also download this list here

All datasets in the Stevens Continuous Futures database are accessible via the Quandl API. The database is also available via Quandl's free libraries for R, Python, Matlab, Excel and other tools. For more information on using the API and libraries, click on the API tab on the left menu.

Detailed Methodology for Rolls

There are several reasonable choices for when to "roll" a trading position from an expiring contract to a new contract. For backtesting and analysis, you should always use continuous contract histories that are spliced together using a roll date rule that corresponds exactly to your trading behaviour.

In what follows, the "front contract" is the contract that is expiring, i.e., the contract that you are rolling from* The "back contract" is the new contract, i.e., the contract that you are rolling to.

Last Trading Day

In this case, contracts roll on the last trading date of the expiring (front) contract. Hence continuous contract #1 is always the open contract with the shortest time to expiry, contract #2 is the second shortest, and so on. This method is also known as end-to-end concatenation, because there is no overlap between consecutive "underlying" contracts for a given continuous future. Contracts are spliced end-date to end-date.

First Day of Month

Contracts roll on the first day of the delivery month of the expiring (front) contract. If the front contract expires or settles prior to the first day of the month referenced in the contract name, then it rolls on the contract's last trading date instead. (For example, Crude Oil -- CLZ2013 expired on 20 November 2013, i.e., before the 1st day of December). This is the default method used by many well-known trading terminals.

Open Interest Switch

Contracts roll when the Open Interest of the back contract is greater than that of the front contract. This method is often referred to as "liquidity-based rolling". Note that even if the back OI subsequently falls below front OI ("reverse roll"), the continuous underlying does not switch back.

Rolling on the Open Interest Switch date works well for equity, metal and currency futures, where liquidity is the dominant factor for determining which contract to hold. But this method does not work well for contracts where the "term structure" has economic meaning, such as agriculture, energy and short-rate futures.

Detailed Methodology for Prices

External economic factors such as interest rates, storage costs and deliverable switches mean that there is often a gap in prices between two consecutive contracts. For example the CME Soybean futures (S) contract for March 2010 expired on 12 March 2010. The settle price on that date was 926. After March the next contract is May, which had a settle price of 925.50 on the same date. If we were to splice the March and May contracts "as is", there would be a discontinuous jump of 0.50 in the price history. This breaks many trading back-test models, and can lead to major errors in PL attribution.

To avoid this problem, a number of price adjustments have been proposed. "Panama Canal" methods shift all the prices for individual contracts up or down by constant amounts (akin to ships moving up and down locks in the

Panama Canal) in order to eliminate discontinuities or jumps between consecutive contracts. "Ratio" methods use multiplicative corrections instead of additive offsets. "Calendar-Weighted" methods are predictable and correspond to a mechanical roll strategy.

The Stevens Continuous Futures database provides custom-built histories for each of these price adjustment rules. In what follows, the "front contract" is the contract that is expiring, i.e., the contract that you are rolling from. The "back contract" is the new contract, i.e., the contract that you are rolling to. Thus in the above example, March Soybeans are the front contract and May Soybeans are the back contract.

Forwards Panama Canal Method

Price histories of each contract are shifted up or down by a constant amount, starting with the oldest contract and working forwards, so as to eliminate price jumps between consecutive contracts. On every roll date, we compute the difference between the back contract's settle price and the front contract's settle price (back settle minus front settle). This difference is added to the **back contract**. Thus "current prices" in this type of adjusted contract do not reflect the market price of the actual underlying future contract. However, the oldest prices in the continuous history match the underlying futures prices; hence this adjustment method is also called the "first true method".

Backwards Panama Canal Method

Price histories of each contract are shifted up or down by a constant amount, starting with the newest contract and working backwards, so as to eliminate price jumps between consecutive contracts. On every roll date, we compute the difference between the back contract's settle price and the front contract's settle price (back settle minus front settle). This difference is added retroactively to the entire historical series, thus adjusting the full history on every roll date. The advantage of this method is that current continuous price exactly equals the current underlying price; hence this method is also sometimes called the "last true" method. A disadvantage of this method is that the entire history has to be recalculated each time a contract rolls (albeit by a constant offset -- so PL simulations should not be affected).

To avoid biases, the Forwards and Backward Panama Canal Methods should be used with fixed notional amounts of your futures contract. PL should be calculated based on price differences. Note that in commodities with consistent contango or backwardation, historical prices can go negative in the Panama methods.

Backwards Ratio Method

Price histories of each underlying contract are multiplied by a constant amount, starting with the newest contract and working backwards, so as to eliminate jumps in price between consecutive contracts. On every roll date, we compute the ratio between the back contract's settle price and the front contract's settle price (back settle divided by front settle). The entire historical series is then multiplied by this ratio, adjusting the full contract history on every roll date. This method is conceptually similar to how adjustments are handled for stock splits.

To avoid biases when using the Ratio method, PL should be calculated based on price percentage changes. Consistent contango or backwardation can lead to very large or very small absolute magnitudes for historical prices, but percentage-based PL calculations should be immune to that.

Calendar-Weighted Method

The price gap between consecutive contracts is smoothed using a weighted-average of the front and back contract prices during a 4-day "roll window". On the 4th day before roll, the price is made up of 80% of the front

contract price and 20% of the back contract. On the 3rd day the price is 60% front contract price and 40% back contract price. On the 2nd day before the roll the price is 40% front contract price and 60% back contract price. On the day before the roll date the price is 20% front contract and 80% back contract. On the roll day the price is solely comprised of the back contract price, i.e., the rollover is complete.

This price adjustment corresponds to a perfectly deterministic rolling strategy, wherein the trader rolls 20% of the position 4 days before the roll, another 20% 3 days before the roll, and so on. Notice that it is not possible to use the Calendar-Weighted price adjustment in conjunction with a non-deterministic roll date rule such as Open-Interest-Switching. Calendar-Weighted price adjustment relies on knowing, in advance, when the contract will roll, so that the appropriate weighting may be applied. This is not possible for the OI-based switching rule.

Data Integrity

Stevens Analytics collects raw futures data from 3 separate redundant sources. This data is aggregated using a sophisticated merge algorithm that programmatically identifies errors, gaps and outliers. It then undergoes a comprehensive quality control process that involves a number of fully-automated consistency and completeness tests, and an independent 2-stage manual review process. Historical backfill calculations are carried out twice by two redundant and independent analytics systems that share no code. The final output is then regressed against a proprietary data feed for accuracy and robustness.

Despite our best efforts to avoid errors, sometimes flaws do occur in our data. We offer a bounty program for users who write to us identifying and fixing errors in our data.

Additional Resources

For a downloadable list of all 78 distinct futures contracts in the SCF database, along with useful metadata such as contract size, tick size, deliverable, expiry months, and historical depth, please click here.

For a downloadable list of all 1200+ continuous futures codes in the SCF database, please click here.

If you have any other questions or concerns, please email our premium customer support, and we will do our best to help you.