

Futures Market Dynamic Price Banding Mechanism

I. Applicable products

1. Phase-one products (Launched on 22th January 2018) : Spot month contracts, next calendar month contracts and the calendar spread orders composed of a spot month contract and the next calendar month contract of TAIEX Futures and Mini-TAIEX Futures.
2. Phase-two products (Launched on 19th November 2018): All Domestic Equity Index Futures
 - ✓ The next third calendar month contract, the next three quarterly months and the calendar spread of TAIEX Futures.
 - ✓ The weekly contract, the next third calendar month contract, the next three quarterly months and the calendar spread of Mini-TAIEX Futures.
 - ✓ The spot month, the next two calendar months, and the next three quarterly months and calendar spread of Electronic Sector Index Futures, Finance Sector Index Futures, Non-Finance Non-Electronics Sub-Index Futures, Taiwan 50 Index Futures and Taipei Exchange Stock Index Futures.
3. Phase-three product (TAIFEX will launch on 27th May 2019): All contract months of TAIEX Options (Including all single orders and combination orders).

II. How dynamic price banding works

1. TAIFEX will check each new order (including limit orders, market orders and market with protection orders) and simulate a matched price based on the order book at the time. TAIFEX will reject buy (sell) orders with a simulated matched price above (below) the upper (lower) limit of TAIFEX' dynamic price band.
 - ✓ Buy Orders: simulated matched price > the upper limit of dynamic price band → reject order

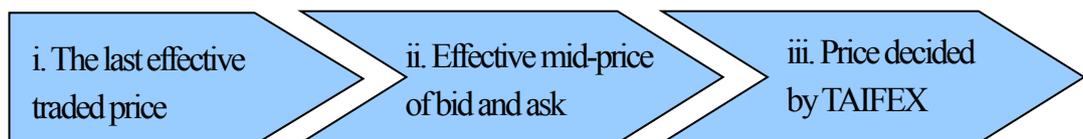
- ✓ Sell Orders: simulated matched price < the lower limit of dynamic price band → reject order
- 2. Only new orders that may cause abnormal price movements will be rejected. Price modifications are treated as new orders and are subject to dynamic price banding.
- 3. Implied orders of Futures constructed by TAIEX' trading system are not actual orders and therefore not subject to dynamic price banding.
- 4. Upon receiving a combination order of TAIEX Options, each component (leg) of the combination order will be checked. If any simulate matched price of the components (legs) exceed its price band, the combination order will be rejected.

III. Calculation of the limits of dynamic price band

1. Upper limit of price band: Base Price + Variation Range
Lower limit of price band: Base Price – Variation Range
2. Base Price

(1) Domestic Equity Index Futures

Base price determination sequence:



- i. The last effective traded price: In principal, base price is the last traded price prior to the time at which the base price is determined. The last traded price has to fulfill the criteria of the effective traded price.
 - ✓ The time lag between the effective traded price and the base price must be within a predetermined number of seconds.
 - ✓ The last traded price must be within a predetermined range from the effective mid-price of bid and ask.

- ii. Effective mid-price of bid and ask: If the last effective traded price isn't available, base price is effective mid-price of bid and ask.
 - ✓ The effective mid-price is a volume-weighted average price of a series of bid and ask prices starting from the best ones.
 - ✓ The accumulated bid/ask volume used in calculating the effective mid-price should reach a predetermined threshold set by TAIEX.
 - ✓ (The volume-weighted average ask price \div The volume-weighted average bid price) \leq a predetermined ratio.
- iii. Price decided by TAIEX: When neither i nor ii is available, TAIEX will determine the base price by referring to the underlying index price, the impact of index-component dividends, and relevant global and domestic product prices.

(2) TAIEX Options : Base Price is calculated using options pricing model with the following parameters:

- ✓ Underlying Price
- ✓ Volatility
- ✓ Interest Rate
- ✓ Strike Price
- ✓ Time to expiration

3. Variation Range

(1) Domestic Equity Index Futures

- ✓ Outright Contracts = the most recent closing price of underlying index \times outright rejection threshold (2%)
- ✓ Calendar Spread = the most recent closing price of underlying index \times spread rejection threshold (1%)

(2) TAIEX Options : The most recent closing price \times rejection

threshold (2%), adjusted with the Delta value and expiry of each contract.

- i. For Weekly Contracts and the Front month contract: variation range is determined based on Delta value:
 - a. Prior to the latest volatility parameter of the trading session is available: variation range equals the most recent closing price of underlying index \times rejection threshold (2%)
 - b. After the latest volatility parameter of the trading session is available: variation range equals the most recent closing price of underlying index \times rejection threshold (2%) \times Delta \times 2
 - ✓ When the absolute value of Delta is less than 0.25, Delta value will be replaced with 0.25.
 - ✓ When the absolute value of Delta is greater than 0.5, Delta value will be replaced with 0.5.
- ii. For other expiration months: variation range equals the most recent closing price of underlying index \times rejection threshold (2%)

(3) Examples of Variation Range calculation

- ✓ Assuming that the last closing price of the TAIEX index is 10,000 points, the variation range for the following regular trading session are calculated as follow :
 - For TAIEX Futures
 - The variation range of outright contract is 200 points (= $10,000 \times 2\%$).
 - The variation range of calendar spread is 100 points (= $10,000 \times 1\%$).
 - For the weekly contracts and the front month contract of TAIEX Options

- Prior to the latest volatility parameter of the trading session is available: variation range = $10,000 \times 2\% = 200$ points
- After the latest volatility parameter of the trading session is available:
 - ◆ When the absolute value of Delta = 0.1 (less than 0.25), variation range = $10,000 \times 2\% \times 0.25 \times 2 = 100$ points
 - ◆ When the absolute value of Delta = 0.3, variation range = $10,000 \times 2\% \times 0.3 \times 2 = 120$ points
 - ◆ When the absolute value of Delta = 0.5, variation range = $10,000 \times 2\% \times 0.5 \times 2 = 200$ points
 - ◆ If the absolute value of Delta = 0.7 (greater than 0.5), variation range = $10,000 \times 2\% \times 0.5 \times 2 = 200$ points
- For other expiration months of TAIEX Options
 - Variation range = $10,000 \times 2\% = 200$ points

IV. Applicability within trading sessions

Regular trading session	Call auction (8:30~8:45)	Not applicable
	Continuous matching (8:45~13:45)	Applicable
After-hour trading session	Call auction (14:50~15:00)	Not applicable
	Continuous matching (15:00~next day 5:00)	Applicable

Note: Dynamic price banding is not applicable to block trades.

V. Dynamic price banding with different order types

- ✓ Rest of Session (ROD) or Immediate or Cancel (IOC): Any portion of the order of which the simulated matched price is above (below) the upper (lower) limit of TAIFEX' dynamic price band will be rejected, while the remainder of the order with simulated matched prices within the dynamic price band will be executed.
- ✓ Fill or Kill (FOK): If any of the simulated matched prices are above (below) the upper (lower) limit of TAIFEX' dynamic price band, the whole order will be rejected.
- ✓ Example: an investor submits a limit order to buy 5 lots of the TX spot month contract. The simulated matched prices of 4 lots are within the dynamic price band, while the simulated match price of 1 lot exceeds the upper limit.
 - If the limit order is an ROD or IOC order: 4 lots will be executed, while 1 lot will be rejected.
 - If the limit order is an FOK order: the whole order (5 lots) will be rejected.

VI. Special situations resulting in adjustment or suspension of dynamic price band, when the quantitative or non-quantitative standards listed below are met:

(1) Non-Quantitative standards

- ✓ In the event of a natural disaster, riot, war or other force majeure events that may affect the trading at TAIFEX, TAIFEX may announce adjustments to the variation range or the suspension of dynamic price banding.
- ✓ For other circumstances deem necessary, TAIFEX may announce adjustments to the variation range.
- ✓ For circumstances that may affect the normal operation of

dynamic price banding, TAIFEX may announce the suspension of dynamic price banding.

(2) Quantitative standards

- ✓ When the futures trading volatility index reaching the limit set at TAIFEX' discretion, TAIFEX may announce adjustments to the variation range.
- ✓ When domestic or foreign futures market or spot market raise more than a certain ratio set by TAIFEX, TAIFEX may double the variation range of TAIEX Call Options upper limit and Put Options lower limit.
- ✓ When domestic or foreign futures market or spot market decline more than a certain ratio set by TAIFEX, TAIFEX may double the variation range of TAIEX Call Options lower limit and Put Options upper limit.

VII. Disclosure of dynamic price banding

Regular Trading Session

(http://info512.taifex.com.tw/EN/DynaPriceBand_Norl.aspx)

After-Hour Trading Session

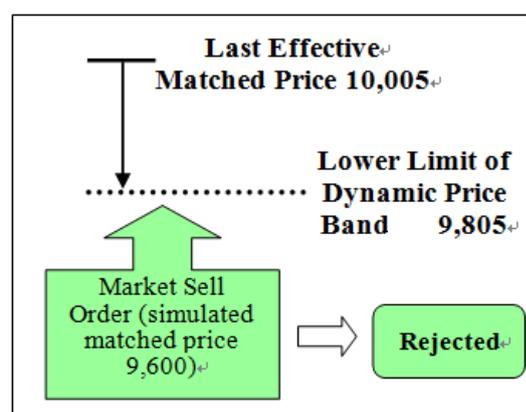
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VIII. Examples

1. Domestic Equity Index Futures

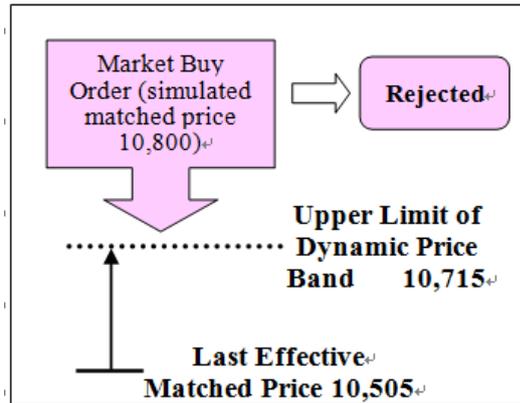
Example 1: Assuming that the last closing price of the TAIEX index is 10,000 points and that the last traded price of the spot month of TAIEX Futures contract prior to the time at which the base price is determined at 10,005 points, then the upper and lower limits of the dynamic price band will be 10,205 points ($=10,005+(10,000 \times 2\%)$) and 9,805 points ($=10,005-(10,000 \times 2\%)$), respectively. If an investor submits a market order to sell 1 lot of TAIEX Futures, and the simulated matched price is 9,600, which is below the lower limit of 9,805 points, the order will be rejected.

Bid	Price	Ask
	10004	8
	10003	10
	10002	20
	10001	14
	10000	10
1	9600	
5	9599	
4	9598	
5	9597	
10	9596	



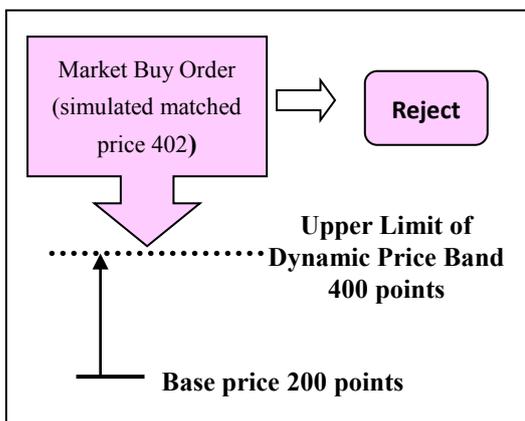
Example 2: Assuming that the last closing price of the TAIEX index is 10,500 points and the last traded price of the spot month of TAIEX Futures contract prior to the time at which the base price is determined at 10,505 points, then the upper and lower limits of the dynamic price band will be 10,715 points ($=10,505+(10,500 \times 2\%)$) and 10,295 points ($=10,505 - (10,500 \times 2\%)$), respectively. If an investor submits a market order to buy 1 lot of TAIEX Futures, and the simulated matched price is 10,800, which is above the upper limit of 10,715 points, the order will be rejected.

Bid	Price	Ask
	10804	8
	10803	10
	10802	10
	10801	8
	10800	1
10	10500	
5	10499	
10	10498	
5	10497	
10	10496	



2. TAIEX Options

Example 1: Assuming that the last closing price of the TAIEX index is 10,000 points, the variation range of the front month contract of TAIEX 9600 PUT Option for the day session is 200 points and Base Price is 200 points. The upper and lower limits of the dynamic price band will be 400 points ($=200+(10,000 \times 2\%)$) and 0.1 points ($=200 - (10,000 \times 2\%)$), respectively. If an investor submits a market order to buy 1 lot of TAIEX 9600 PUT Option contract, and the simulated matched price is 402, which is above the upper limit of 400 points, the order will be rejected.



Bid	Price	Ask
	615	9
	611	7
	518	5
	415	5
	402	1
10	198	
5	177	
10	165	
5	140	
10	120	

Example 2: Assuming that the upper limit of the second month contract of TAIEX 9600 PUT options is 250 points and the lower limit is 0.1 points. Also, the upper limit of the second month contract of TAIEX 9500 PUT options is 240 points and the lower limit is 0.1 points. If an investor submits a long calendar spread combination order to buy 1 lot of 9500 PUT and sell 1 lot of 9600 PUT when the order books are below. As the simulated matched price of the 9500 PUT is 244 points, which is above the upper limit of 240 points, the combination order will be rejected.

Order book of 9500 PUT

Bid	Price	Ask
	280	9
	274	7
	273	5
	270	5
	244	1
10	150	
5	143	
10	135	
5	132	
10	128	

Order book of 9600 PUT

Bid	Price	Ask
	190	11
	167	14
	165	13
	162	18
	158	11
9	154	
8	149	
5	147	
4	143	
10	122	

