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TAIWAN FUTURES EXCHANGE

Futures Market Dynamic Price Banding Mechanism

Invigorating Futures Trading and Serving the Real Economy

Fulfilling Hedging Needs and Facilitating Price Discovery

Taiwan Futures Exchange
Oct-Nov, 2018

Outline

- Purpose
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Purpose

Purpose

- **Reduce abnormal price fluctuations by preventing erroneous trades, fat finger incidents and momentary intraday order book imbalances**
- **Enhance market integrity**
- **Stay in line with global markets**

Introduction

Applicable products

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- **Phase-one products (Launched on 22th January 2018)**
  - **TAIEX Futures and Mini-TAIEX Futures: 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.**
- **Phase-two products (TAIFEX will launch on 19th November 2018): All Domestic Equity Index Futures**
  - **TAIEX Futures: The next third calendar month contract, the next three quarterly months and the calendar spread**
  - **Mini-TAIEX Futures: The weekly contract, the next third calendar month contract, the next three quarterly months and the calendar spread**
  - **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: The spot month, the next two calendar months, and the next three quarterly months and calendar spread**

Applicable trading time

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Applicable trading time[1]

Regular Trading Session	**Opening Call Auction (8:30 ~ 8:45)**	**Not Applicable**
	Continuous Matching (8:45 ~ 13:45)	Applicable
After-Hour Trading Session	Opening Call Auction (14:50 ~ 15:00)	Not Applicable
	Continuous Matching (15:00 ~ next day 5:00)	Applicable

1. Dynamic price banding is not applicable to block trades.

How dynamic price banding works

- TAIFEX checks each new order[1] (including limit orders, market orders and market with protection orders[2]) and simulates matched prices based on the order book at the time.
  - 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
  - Only new orders that may cause abnormal price movements will be rejected; other transactions remain unaffected.

**When simulated matched prices can't be generated for a newly submitted buy (sell) order because there is no existing counterparty sell (buy) order in the order book, TAIFEX will reject the buy (sell) order if the designated bid (offer) price of the buy (sell) order is above (below) the upper (lower) limit of TAIFEX's dynamic price band.*

1. Price modifications are treated as new orders and are subject to dynamic price banding.
2. Implied orders constructed by TAIFEX' trading system are not actual orders and therefore not subject to dynamic price banding.

Calculation of the limits of dynamic price band

- Upper limit : base price + Variation range
- Lower limit : base price - Variation range

  - Ranges are calculated before market open every day.
  - The range is fixed for during the trading session.

- Base price determination sequence

1. The last effective traded price	2. Effective mid-price of bid and ask	3.Price decided by TAIFEX
- 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	- 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 TAIFEX. - (The volume-weighted average ask price ÷ The volume-weighted average bid price)<= a predetermined ratio	TAIFEX 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.

Calculation of the variation range

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Variation Range

- Outright Month Contracts: the most recent closing price of the underlying index × **2%**
- Calendar Spread: the most recent closing price of the underlying index × **1%**

Example: Assuming a TAIEX index closing price of 11,000 points on Nov. 5:

- For the after-hour trading session beginning at 3pm on Nov. 5 and the regular trading session beginning at 8:45am on Nov. 6:
  - The TX and MTX variation range for spot month and the next calendar month contracts is 220 points (=11,000 × 2%).
  - The TX and MTX variation range for calendar spread orders is 110 points (=11,000 × 1%).

Dynamic price banding with different order types

Order type	Treatment
Rest of Session (ROD)	■ 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.
Immediate or Cancel (IOC)	
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.

Other issues

- **Unusual market conditions: TAIFEX may adjust the variation range or suspend the dynamic price banding mechanism when necessary.**
  - Quantitative indicators: When predetermined quantitative indicators are triggered, TAIFEX may adjust the variation range. (For example, double the original variation range.)
  - Qualitative indicators: In the event of a natural disaster, riot, war, or other force majeure event, TAIFEX may adjust the variation range or suspend the dynamic price banding mechanism.
- **System messages**
  - When an order is rejected due to dynamic price banding: the “simulated matched prices exceeded dynamic price banding” system message and “the base price belonging to the rejected order” will be sent.
  - Variation range: the dynamic price banding variation ranges of applicable products will be sent through the system before market open.
  - Adjustment to variation range: the “variation range relaxed” system message will be sent before market open or during trading hours.
  - Suspension of the dynamic price banding mechanism:
    - Qualitative indicators reached: the “dynamic price banding mechanism suspended” system message will be sent;
    - Suspension of dynamic price banding due to system failure: the “dynamic price banding mechanism suspended” system message will be sent. Once the system issue is resolved, the “dynamic price banding mechanism resumed” system message will be sent.

Examples

Example 1: Limit buy order with simulated matched prices below the upper limit

- Assuming the base price (the last effective traded price) is 1,250 pts and the variation range is 25 pts, the upper limit of the dynamic price band is 1,275 pts (=1,250+25).
- If an investor submits an ROD limit order to buy 15 lots of the TF spot month contract at 1,255 pts:
- According to the order book at the time, the simulated matched prices are 1,250 pts (7 lots), 1,250.2 pts (3 lots), and 1,250.4 pts (5 lots). Therefore, the order will not be rejected.

Bid	Price	Ask
	1275.2	8
	…	…
	1250.8	15
	1250.6	12
	1250.4	5
	1250.2	3
	1250	7
15	9999	
22	9998	
13	9997	
10	9996	
10	9995	

1,275 pts – the upper limit of DPB

*DPB=dynamic price band

Example 2: Limit sell order with simulated matched prices above the lower limit

- Assuming the base price (the last effective traded price) is 450 pts and the variation range is 9 pts, the lower limit of the dynamic price band is 441 pts (=450-9).
- If an investor submits an ROD limit order to sell 15 lots of the TE next calendar month contract at 449.5 pts:
- According to the order book at the time, the simulated matched prices are 449.95 pts (5 lots), 449.9 pts (3 lots), 449.85 pts (3 lots) and 449.8 pts (4 lots). Therefore, the order will not be rejected.

Bid	Price	Ask
	450.2	15
	450.15	10
	450.1	7
	450.05	8
	450	10
5	449.95	
3	449.9	
3	449.85	
10	449.8	
5	449.75	
…	…	
20	440.9	

441 pts – the lower limit of DPB

*DPB=dynamic price band

Example 3: Limit buy order with simulated matched prices above the upper limit

- Assuming the base price (the last effective traded price) is 8,000 pts and the variation range is 160 pts, the upper limit of the dynamic price band is 8,160 pts (=8,000+160). If an investor submits a limit order to buy 15 lots of the T5F spot month contract at 8,400 pts:
- According to the order book at the time, the simulated matched prices are 8,001 pts (10 lots), 8,300 pts (2 lots) and 8,400 pts (3 lots):
  - If the order is an ROD order or IOC order: 10 lots will be matched at 8,001 pts, while the remaining 5 lots will be rejected as their simulated matched prices are above the upper limit.
  - If the order is an FOK order: the whole order will be rejected.

Bid	Price	Ask
	8600	10
	8500	10
	8400	3
	8300	2
	8001	10
5	7999	
2	7998	
3	7997	
10	7996	
10	7995	

8,160 pts – the upper limit of DPB

*DPB=dynamic price band

Example 4: Limit sell order with simulated matched prices below the lower limit

- Assuming the base price (the effective mid-price of the bid and ask) is 12,500 pts and the variation range is 250 pts, the lower limit of the dynamic price band is 12,250 pts (=12,500-250). If an investor submits a limit order to sell 15 lots of the XIF spot month contract at 11,900 pts:
- According to the order book at the time, the simulated matched prices are 12,499 pts (5 lots), 12,050 pts (3 lots), 12,000 pts (3 lots) and 11,990 pts (4 lots):
  - If the order is an ROD order or IOC order: 5 lots will be matched at 12,499 pts, while the remaining 10 lots will be rejected as their simulated matched prices are below the lower limit.
  - If the order is an FOK order: the whole order will be rejected.

Bid	Price	Ask
	12505	10
	12504	10
	12503	7
	12502	5
	12501	10
5	12499	
3	12050	
3	12000	
10	11990	
5	11980	

12,250 pts – the lower limit of DPB

*DPB=dynamic price band

Example 5: Market buy order with simulated matched prices above the upper limit

- Assuming the base price (the last effective traded price) is 140 pts and the variation range is 2.8 pts, the upper limit of the dynamic price band is 142.8 pts (=140+2.8). If an investor submits a market order to buy 15 lots of the GTF spot month contract:
- According to the order book at the time, the simulated matched prices are 140 pts (10 lots), 144 pts (2 lots) and 145 pts (3 lots):
  - If the order is an IOC order: 10 lots will be matched at 140 pts, while the remaining 5 lots will be rejected as their simulated matched prices are above the upper limit.
  - If the order is an FOK order: the whole order will be rejected.

Bid	Price	Ask
	146	20
	145.5	10
	145	3
	144	2
	140	10
5	139.95	
2	139.9	
3	139.85	
10	139.8	
20	139.75	

142.8 pts – the upper limit of DPB

*DPB=dynamic price band

Example 6: Market sell order with simulated matched prices below the lower limit

- Assuming the base price (the effective mid-price of the bid and ask) is 10,900 pts and the variation range is 218 pts, the lower limit of the dynamic price band is 10,682 pts (=10,900-218). If an investor submits a market order to sell 20 lots of the MTX weekly contract:
- According to the order book at the time, the simulated matched prices are 10,899 pts (10 lots), 10,650 pts (4 lots) and 10,600 pts (6 lots):
  - If the order is an IOC order: 10 lots will be matched at 10,899 pts, while the remaining 10 lots will be rejected as their simulated matched prices are below the lower limit.
  - If the order is an FOK order: the whole order will be rejected.

Bid	Price	Ask
	10905	10
	10904	10
	10903	7
	10902	5
	10901	20
10	10899	
4	10650	
6	10600	
10	10500	
25	10400	

10,682 pts – the lower limit of DPB

*DPB=dynamic price band

Example 7: Market with protection buy order with simulated matched prices above the upper limit

- Assuming the base price (the last effective traded price) is 10,800 pts and the variation range is 216 pts, the upper limit of the dynamic price band is 11,016 pts (=10,800+216). If an investor submits a market with protection order to buy 15 lots of the TX next calendar month contract:
- If the converted buying price of the MWP order is 11,068 pts (=11,014 pts [best bid] + 54 pts [protected range]):
- According to the order book at the time, the simulated matched prices are 11,015 pts (10 lots), 11,018 pts (2 lots) and 11,050 pts (3 lots):
  - If the order is an IOC order: 10 lots will be matched at 11,015 pts, while the remaining 5 lots will be rejected as their simulated matched prices are above the upper limit.
  - If the order is an FOK order: the whole order will be rejected.

Bid	Price	Ask
	11200	10
	11100	10
	11050	3
	11018	2
	11015	10
1	11014	
2	10800	
3	10799	
10	10798	
10	10797	

11,016 pts – the upper limit of DPB

*DPB=dynamic price band

Example 8: Market with protection sell order with simulated matched prices below the lower limit

- Assuming the base price (the last effective traded price) is 13,000 pts and the variation range is 260 pts, the lower limit of the dynamic price band is 12,740 pts (=13,000-260). If an investor submits a market with protection order to sell 15 lots of the XIF spot month contract:
- If the converted selling price of the MWP order is 12,685 pts (=12,750 pts [best ask] - 65 pts [protected range]):
- According to the order book at the time, the simulated matched prices are 12,745 pts (6 lots), 12,735 pts (3 lots) and 12,725 pts (6 lots)
  - If the order is an IOC order: 6 lots will be matched at 12,745 pts, while the remaining 9 lots will be rejected as their simulated matched prices are below the lower limit.
  - If the order is an FOK order: the whole order will be rejected.

Bid	Price	Ask
	13004	20
	13003	9
	13002	7
	13001	15
	12750	1
6	12745	
3	12735	
7	12725	
10	12715	
15	12710	

12,740 pts – the lower limit of DPB

*DPB=dynamic price band

Example 9: Limit buy order without simulated matched prices, bid price above the upper limit

- Assuming the base price (the last effective traded price) is 1,200 points and the variation range is 24 points, the upper limit of the dynamic price band is 1,224 (=1,200+24). If an investor submits a limit order to buy 15 lots of the TX spot month contract at 1,240 pts:
- According to the order book at the time, the simulated matched prices are 1,200.2 pts (8 lots) and 1,200.4 pts (2 lots) while the remaining 5 lots do not have simulated matched prices as there are no matching counterparty orders:
  - If the order is an ROD or IOC order: 8 lots will be matched at 1,200.2 pts and 2 lots at 1,200.4 pts, while the remaining 5 lots will be rejected as the bid price 1,240 is above the upper limit (1,224).
  - If the order is an FOK order: the whole order will be rejected.

Bid	Price	Ask
	1270	10
	1260	10
	1250	3
	1200.4	2
	1200.2	8
5	1200	
2	1199.8	
3	1199.6	
10	1199.4	
10	1199.2	

1,224 pts – the upper limit of DPB

*DPB=dynamic price band

Example 10: Limit sell order without simulated matched prices, ask price below the lower limit

- Assuming the base price (the last effective traded price) is 480 pts and the variation range is 9.6 pts, the lower limit of the dynamic price band is 470.4 pts (=480-9.6). If an investor submits a limit order to sell 15 lots of the TE spot month contract at 460 pts:
- According to the order book at the time, no simulated matched prices can be generated :
  - If the order is an ROD or IOC order: the whole order will be rejected as the ask price 460 pts is below the lower limit (470.4 pts).
  - If the order is an FOK order: the whole order will be rejected.

Bid	Price	Ask
	480.8	10
	480.6	10
	480.4	3
	480.2	2
	480	7
3	450	
10	445	
5	440	
No other orders		

470.4 pts – the lower limit of DPB

*DPB=dynamic price band

Example 11 (Combination order): Limit buy order with simulated matched prices above the upper limit

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- Assuming the base price (the effective mid-price of the bid and ask) is -9 pts and the variation range is 125 pts, the upper limit of the dynamic price band is 116 pts (=-9+125). If an investor submits a limit order to buy 20 lots of the XIF spot / next calendar month spread at 150 pts:
- According to the order book at the time, the simulated matched prices are -8 pts (10 lots), -7 pts (2 lots) and 120 pts (8 lots):
  - If the order is an ROD or IOC order: 10 lots will be matched at -8 pts and 2 lots at -7 pts, while the remaining 8 lots will be rejected as their simulated matched price(120 pts) is above the upper limit(116 pts).
  - If the order is an FOK order: the whole order will be rejected.

Bid	Price	Ask
	125	5
	122	7
	120	10
	-7	2
	-8	10
15	-10	
2	-11	
3	-12	
4	-13	
5	-14	

116 pts – the upper limit of DPB

*DPB=dynamic price band

Example 12 (Combination order): Limit sell order with simulated matched prices below the lower limit

- Assuming the base price (the last effective traded price) is -9 pts and the variation range is 80 pts, the lower limit of the dynamic price band is -89 (=-9-80). If an investor submits a market order to sell 15 lots of the T5F spot / next calendar month spread:
- According to the order book at the time, the simulated matched prices are -10 pts (10 lots), -11 pts (2 lots) and -95 pts (3 lots):
  - If the order is an ROD or IOC order: 10 lots will be matched at -10 pts and 2 lots at -11 pts, while the remaining 3 lots will be rejected as their simulated matched price(-95 pts) is below the lower limit(-89 pts).
  - If the order is an FOK order: the whole order will be rejected.

Bid	Price	Ask
	-4	5
	-5	7
	-6	10
	-7	2
	-8	6
10	-10	
2	-11	
3	-95	
4	-100	
5	-105	

-89 pts – the lower limit of DPB

*DPB=dynamic price band

Example 13 (Combination order): Market with protection buy order with simulated matched prices above the upper limit

- Assuming the base price (the last effective traded price) is -10 pts and the variation range is 100 pts, the upper limit of the dynamic price band is 90 pts (=-10+100). If an investor submits a market with protection order to buy 15 lots of the TX spot / next calendar month spread:
- If the converted buying price of the MWP order is 105 pts (=80 pts [best bid] + 25 pts [protected range]):
- According to the order book at the time, the simulated matched prices are 82 pts (5 lots), 95 pts (2 lots) and 100 pts (8 lots):
  - If the order is an IOC order: 5 lots will be matched at 82 pts, while the remaining 10 lots will be rejected as their simulated matched prices are above the upper limit.
  - If the order is an FOK order: the whole order will be rejected.

Bid	Price	Ask
	110	5
	105	7
	100	10
	95	2
	82	5
5	80	
2	-10	
3	-11	
4	-12	
5	-13	

90 pts – the upper limit of DPB

*DPB=dynamic price band

Example 14 (Combination order): Limit buy order without simulated matched prices, bid price above the upper limit

- Assuming the base price (the effective mid-price of the bid and ask) is -1 pts and the variation range is 4.5 pts, the upper limit of the dynamic price band is 3.5 pts (=-1+4.5). If an investor submits a limit order to buy 15 lots of the TE spot / next calendar month spread at 5 pts:
- According to the order book at the time, the simulated matched prices are -0.5 pts (5 lots), 0.5 pts (2 lots) but the remaining 8 lots do not have simulated matched prices because there are no matching counterparty orders:
  - If the order is an ROD or IOC order: 5 lots will be matched at -0.5 pts, 2 lots at -0.5 pts while the remaining 8 lots will be rejected as the bid price of 5 pts is above the upper limit (3.5 pts).
  - If the order is an FOK order: the whole order will be rejected.

Bid	Price	Ask
	7.4	5
	7.2	7
	7	10
	0.5	2
	-0.5	5
5	-1	
2	-1.1	
3	-1.15	
4	-1.2	
5	-1.3	

3.5 pts – the upper limit of DPB

*DPB=dynamic price band

Thank You