Deutsche Bank

ECB Presentation:
Forms of API trading in Foreign Exchange

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Passion to Perform

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Introduction to Algorithmic Trading

Why is API/Algorithmic Trading Important ?

Client requirement

Clients are becoming more efficient and driving the trend towards increased use of algorithms for execution of FX

Liquidity fragmentation

Liquidity remains fragmented across many venues requiring the use of smart order routers to achieve "optimal" execution

Technology is an enabler

Technology continues to evolve, allowing the move towards electronic trading

Presentation Overview

- Client Execution Algorithms
- Client DMA Trading
- Trader Execution Algorithms
- High Frequency Trading
- Potential for Unintended Market Impact

Client Execution Algorithms

Client Example

US service company needs to buy large amount of GBP to pay for UK acquisition

Due to size of transaction, it could have material impact on market. Limit Order Slicer used to minimise market impact:

- Split into smaller trade sizes and execute during day

- Trade in London hours unless market moves to certain level

- Set clip interval and size

- Set limit price

- Uses maximum spread function to avoid paying wide spreads

ABFX: Limit Order Slicer

Autobahn - Placing a New Algo Order

Placing a New Algo Order...   London time: 17:06:13

Order Settings

Strategy:	Limit Order Slicer
Currency Pair:	GBPUSD
Currency Traded:	GBP · USD
Buy/Sell:	Buy · Sell
Order Amount:	50,000,000
Clip Interval:	HH · MM · 20
Clip Size:	1,000,000
Order Limit:	ASK · MID · BID
Price Offset:	0
Limit Price:	1.62 50 0
Max Spread:	5
Interval Edges:	Shift · Fix
Current price:	1.62189
Current spread:	2.6

Start Time (LDN)   End Time (LDN)

You will submit a **Limit Order Slicer** order to **BUY** GBP 50,000,000 **SELL** USD.

- Currency Pair = GBPUSD
- Currency Traded = GBP
- Buy/Sell = BUY
- Order Amount = 50,000,000
- Clip Interval = in 00:00:20
- Clip Size = 1,000,000
- Limit Price = 1.625
- Max Spread = 5
- Price Offset = 0

Go!

Warnings:
- current market price is better than the 'Limit Price', execution will attempt to start immediately after placing the order

Templates

Name: Save

- ECB Fix
- EURUSD Limit
- GBP Limit Order Silcer
- Gold Slicer
- USDJPY Limit

Cancel

Client Execution FX Algorithms

Example: Deutsche Bank ABFX

- Autobahn Foreign Exchange Algo enables clients to control slicing, timing and fills of large orders with greater precision and transparency
- Client trades face DB, not the market - insulating the market against operational risk of client trading errors
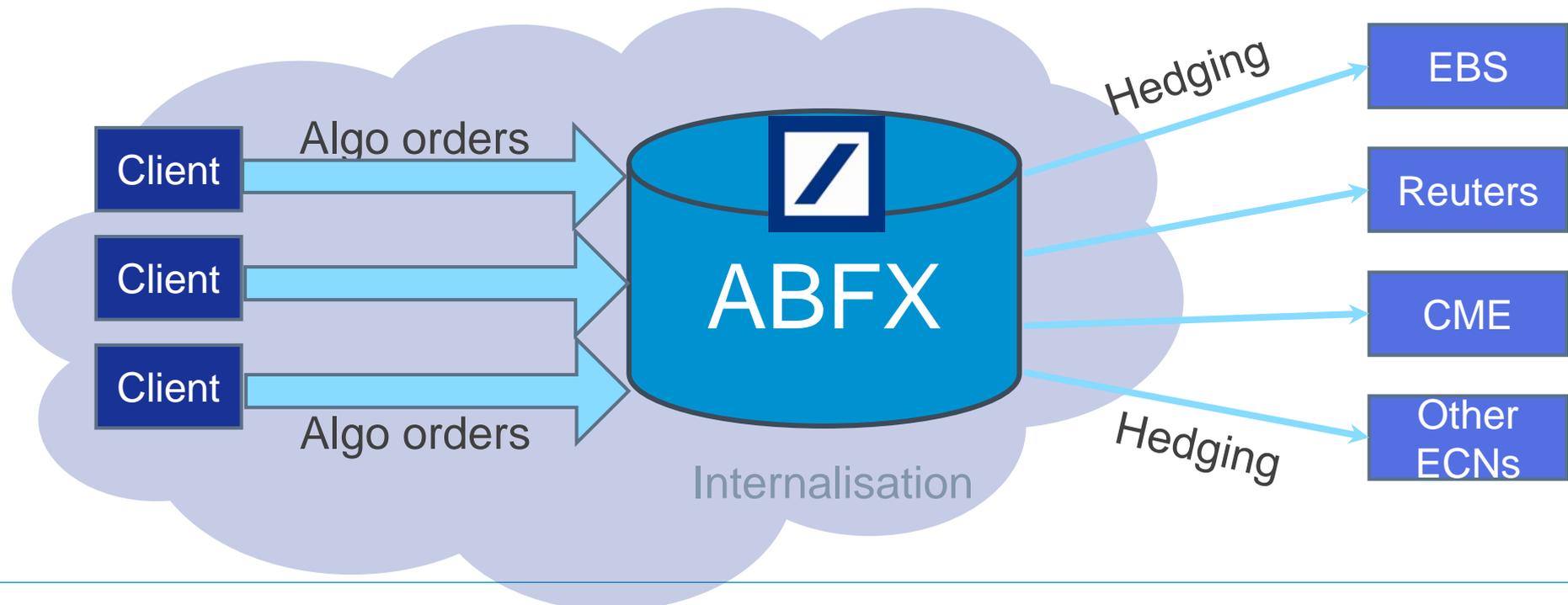
Client DMA Trading

Clients have Direct Market Access

Some banks provide DMA to clients and charge commission in OTC Foreign Exchange as well as Futures markets

N.B. Deutsche Bank does not currently offer DMA in OTC FX
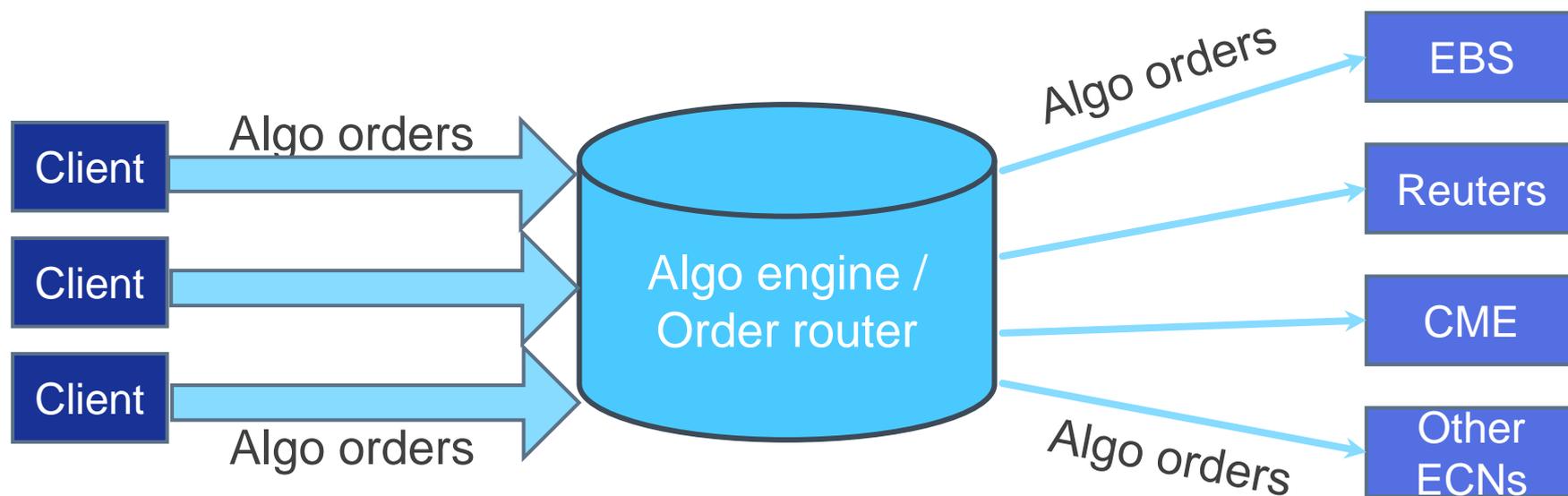
Trader Execution Algorithms
Deutsche Bank process
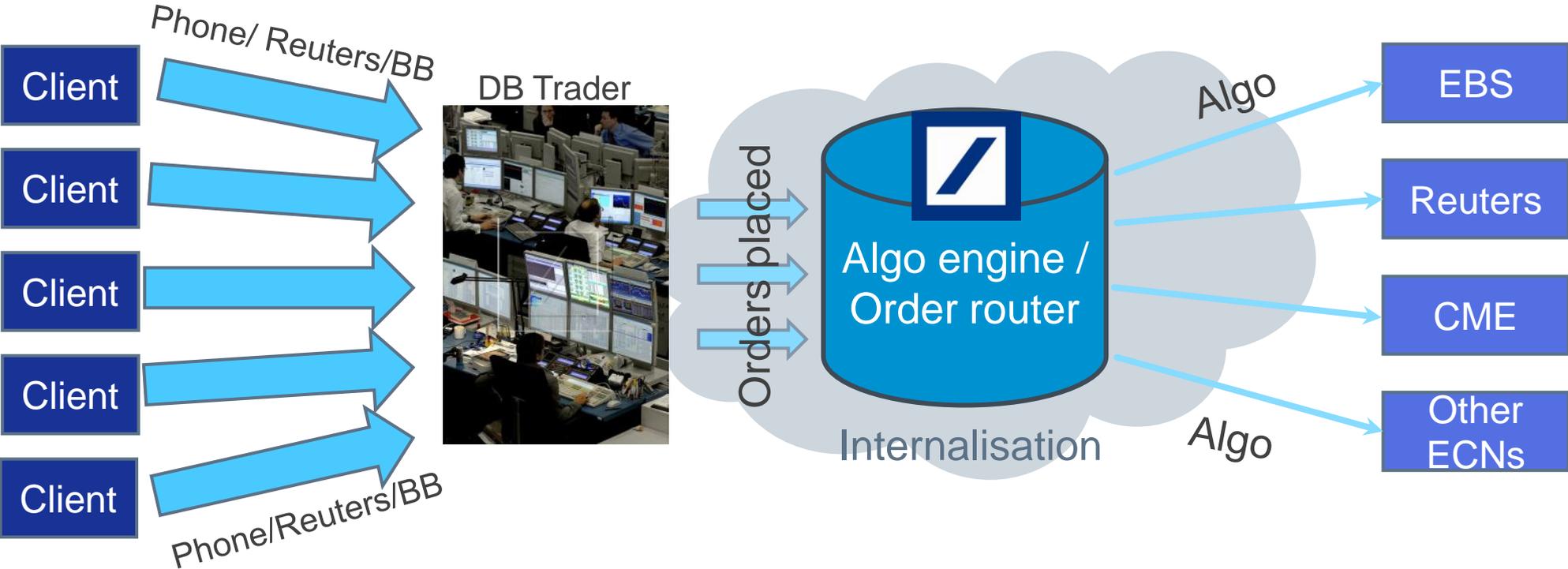
Unintended Market Moves: Execution Algorithms

Controls

Outsized short term market moves can arise where algo orders are placed in the market without adequate controls. It is important that orders have limit prices and don't get caught in loops.

Example: two independent market participants use trader execution algos

Bank A   Algo places order at market bid +1
Bank B   Algo places order at best bid in the market.

Combination of the two strategies could create a "loop" resulting in the market walking up. If this is during a period of low liquidity, move could be outsized.

What is High Frequency Trading?

High frequency trading is a set of computerized trading strategies characterized by extremely short position-holding periods. Programs running on high-speed computers analyze massive amounts of market data, using sophisticated algorithms to exploit trading opportunities that may open up for milliseconds, seconds or minutes.

Examples of High Frequency trading strategies include:

- Market-Making
- Latency Arbitrage
- Event Trading
- Triangular Arbitrage

High Frequency Trading

Typical Operating model for FX prime brokerage
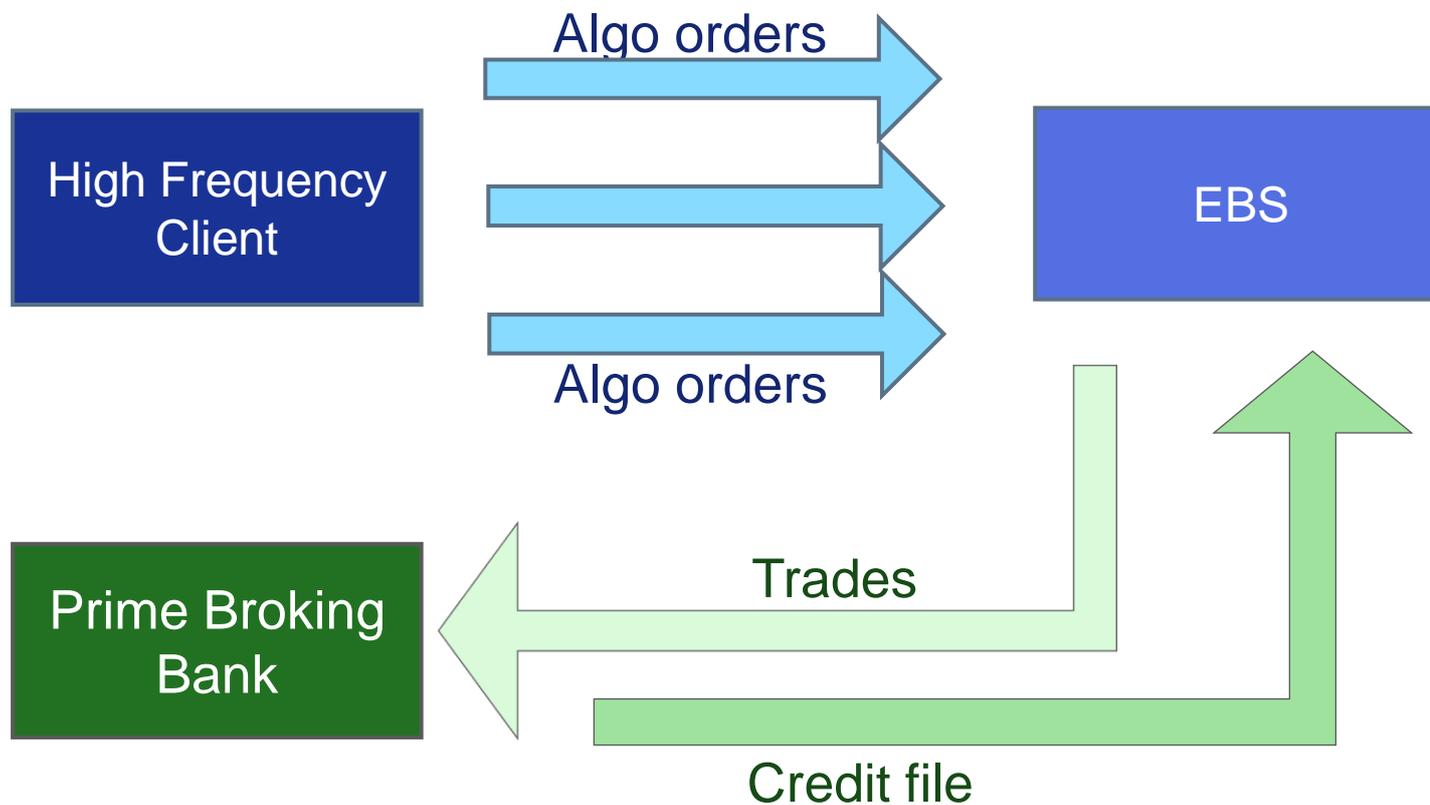
Impact of Algorithmic trading in the FX market

Recent Fed study provides detailed impact analysis of algo trading in Foreign exchange markets. Based on EBS data for 2006- 2007 covering €, $ and ¥ trades, the study asked the following:

Can algo trades result in highly correlated strategies. and cause market disruption? Can they increase volatility?	• Algo trades are more correlated:
	  • BUT no evidence of positive causal relationship between % of algo trades and level of market volatility
	  • AND evidence in the Fed Study points to a negative relationship.

Does algo trading improve or reduce market liquidity at times of market stress?	• Evidence that computers DO provide liquidity during times of market stress:
	  • Algo traders reduce their share of liquidity provision in the minute following major data announcements, when probability of price jump is very high.
	  • However they increase share of liquidity provision to market over the hour following – normally a period of elevated volatility

Who are the more "informed" traders in the market? Who has most impact on price discovery?	• Human trades account for larger share of price movements in the €/$ and ¥/$ markets in spite of sizeable fraction of algo trades • €/¥ - computers and humans equally informed – many of algo traders ad searching for triangular arbitrage opportunities

High Frequency Trading
Case Study from CME

Did HFT play a role on May 6th?

Extraordinary market action in the stock markets on May 6th. Within minutes, DJIA fell by 9% and rebounded.

- Certain HFTs active in both spot and futures markets – as consistent with normally observed patterns
- No evidence that algorithmic trading models deployed for stock index futures traded on CME Group exchanges caused the market fluctuations
- CME believes automated trading to contribute to market efficiencies, bolster liquidity and contribute to price discovery function

N.B This is *CME* view of the events of May 6th

Source: "What Happened on May 6th" by CME Group

FX API/Algorithmic Trading – Summary

Potential for unintended market impact:

	Operational Error in Algorithms	Human Error using Algorithms
Client Execution Algos (non-DMA)	Low	Moderate
Client DMA Algo Trading	High	High
Trader Execution Algos	High	Moderate
High Frequency Trading	High	Low

Current Market: Low frequency of algorithmic errors but each has higher impact
Pre E-trading: High frequency of human error but arguably less impact per error

The evolution of e-trading and resulting spread compression is clearly positive for clients.
API/Algorithmic trading is an important aspect of the move towards efficient markets.