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Algoritmehandel – noen perspektiver
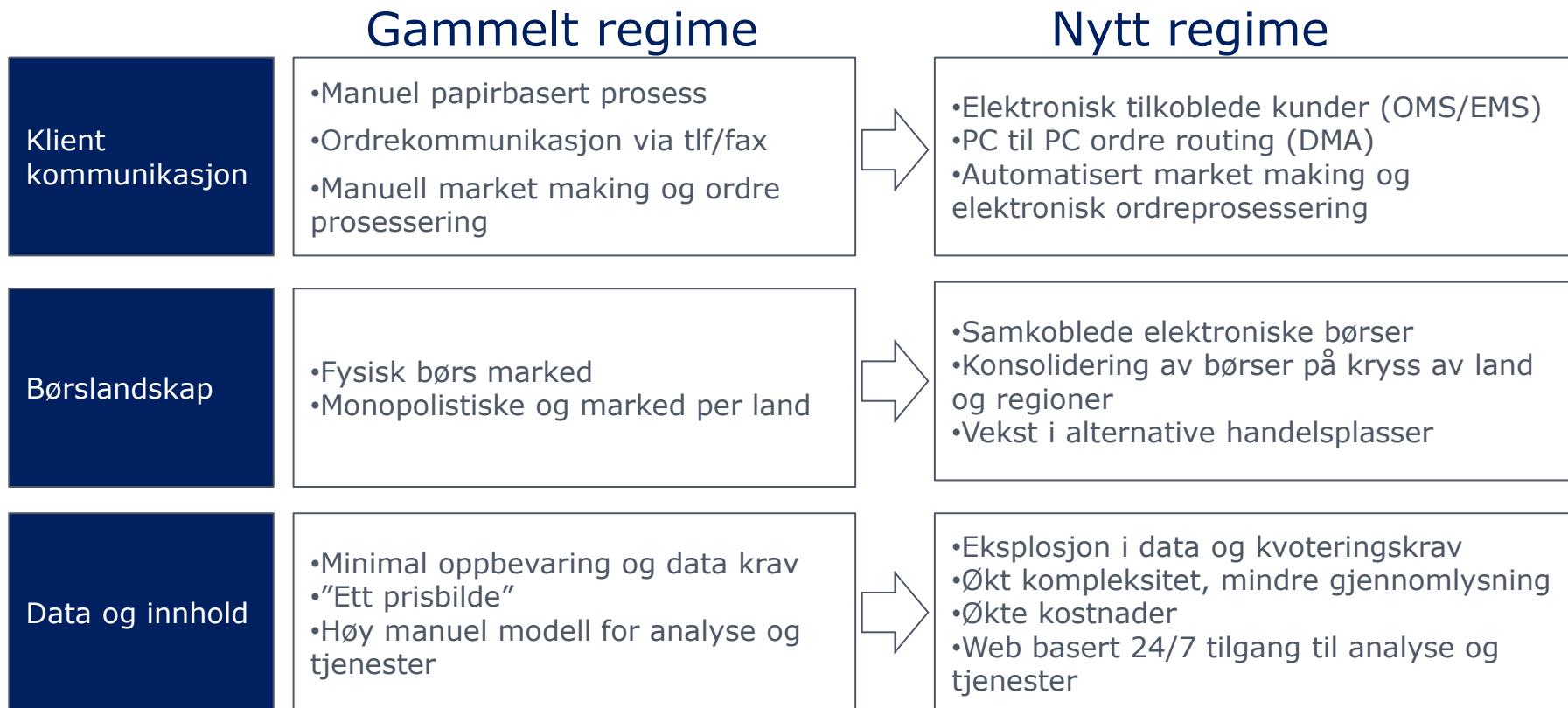
Thomas Borchgrevink

Verdipapirseminar – 1 desember 2010

Agenda

- Markedsplassen endrer seg

- Drivere bak endringer
  - Teknologisk utvikling
  - Fragmentering

- Konsekvenser

- Kort oppsummering

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Grov forenkling av før og nå

	Gammelt regime	**Nytt regime**
Klient kommunikasjon	•Manuel papirbasert prosess •Ordrekommunikasjon via tlf/fax •Manuell market making og ordre prosessering	•Elektronisk tilkoblede kunder (OMS/EMS) •PC til PC ordre routing (DMA) •Automatisert market making og elektronisk ordreprosessering
Børslandskap	•Fysisk børs marked •Monopolistiske og marked per land	•Samkoblede elektroniske børser •Konsolidering av børser på kryss av land og regioner •Vekst i alternative handelsplasser
Data og innhold	•Minimal oppbevaring og data krav •"Ett prisbilde" •Høy manuel modell for analyse og tjenester	•Eksplosjon i data og kvoteringskrav •Økt kompleksitet, mindre gjennomlysning •Økte kostnader •Web basert 24/7 tilgang til analyse og tjenester

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To hoveddrivere bak endringene

- Teknologisk utvikling
  - Ny teknologien gir nye handelsstrategier
  - Nye aktører tar i bruk ny teknologi

- Rammeverk
  - MiFID fra november 2007
  - Fremveksten av alternative markedsplasser

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Teknologisk utvikling - nye tider...

Ultimate Trading Weapon

Spread's one-inch cable is the latest weapon in the technology arms race among Wall Street houses that use algorithms to make lightning-fast trades.

The trading is now practically speaking conducted at the speed of light.

The High Frequency Trading is said to make up about 70% of the total trading in the US stock markets.

"Anybody pinging both markets has to be on this line, or they're dead," says Jon A. Najarian, co-founder of OptionMonster, which tracks high frequency trading.

Spread's advantage lies in its route, which makes nearly a straight line from a data center in Chicago's South Loop to a building across the street from Nasdaq's servers.

Older routes largely follow railroad rights-of-way through Indiana, Ohio and Pennsylvania.

At 825 miles and 13.33 milliseconds, Spread's circuit shaves 100 miles and 3 milliseconds off of the previous route of lowest latency – financial/technical engineers' expression of the length of delay from data are sent to it's received by the other server.

Still Secrecy
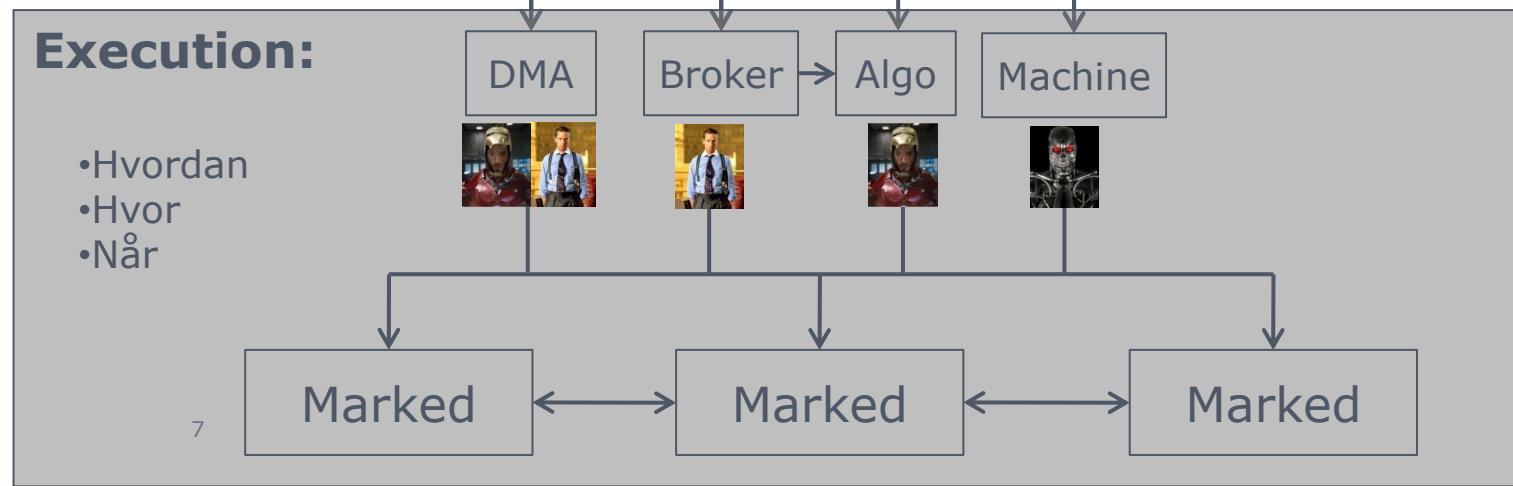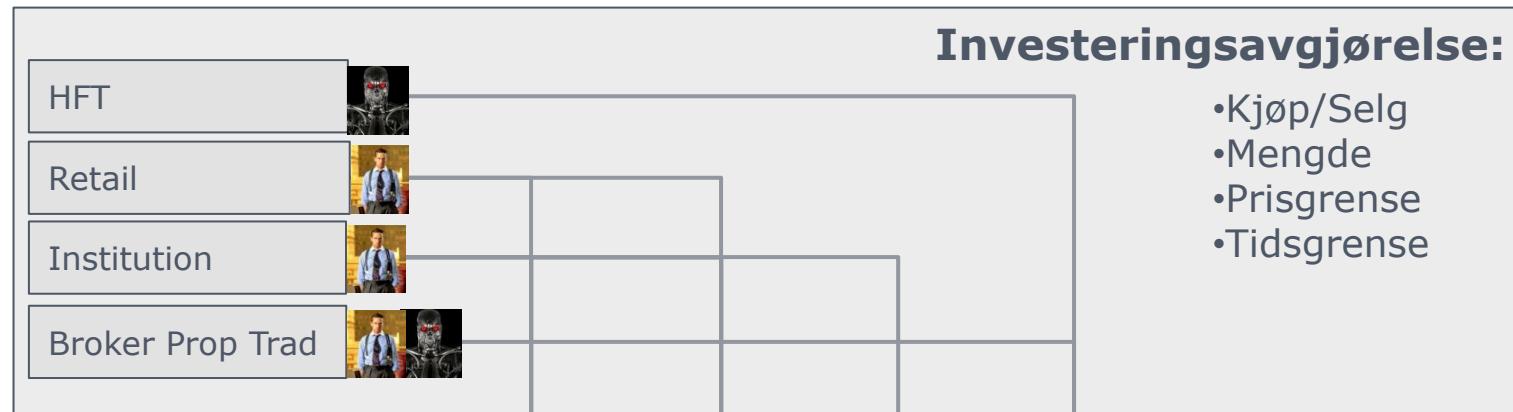
Spread won't disclose the costs.

However, Jason Cohen, chief operating officer of Allied Fiber, which is building a nationwide network, says laying cable through easy terrain runs $200,000 per mile.

But half of Spread's route is going through tough, rocky and untouched terrain.

Forbes estimates the cost of building the ultra-fast connection close to $300 million.

# Intro - *Grov oversikt av Investeringsbeslutning og execution før og nå*

Man   Man & Machine   Machine

Investeringsavgjørelse:

HFT	
Retail	
Institution	
Broker Prop Trad	

- Kjøp/Selg
- Mengde
- Prisgrense
- Tidsgrense

Execution:

- Hvordan
- Hvor
- Når

DMA   Broker → Algo   Machine

Marked ↔ Marked ↔ Marked

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High Frequency Trading – Definisjon...?!

The use of information technology to quickly receive and analyze market data in order to identify and act upon profitable trading opportunities
Spokesman for Principal Traders Group

All-electronic submissions and cancels of orders in milliseconds or microseconds
Director of trading at HTG Capital Partners

Automated analysis of real-time market data to detect patterns that indicate a trading opportunity & instantly place orders in the market
Chief technology officer of Progress Software.

High-frequency trading is the execution of computerized trading strategies characterized by extremely short position-holding periods. In high-frequency trading
Wikipedia

High frequency trading is the placing of very large numbers of orders in a short time: sometimes thousands of orders a second.
*Moneyterms.co.uk*
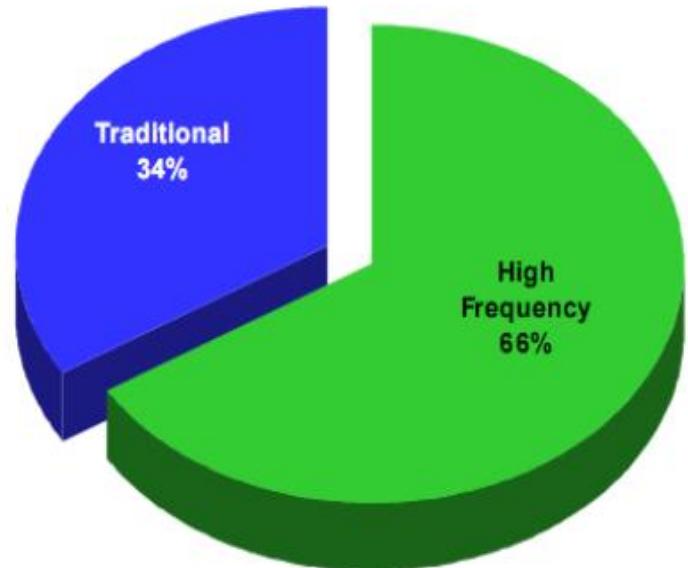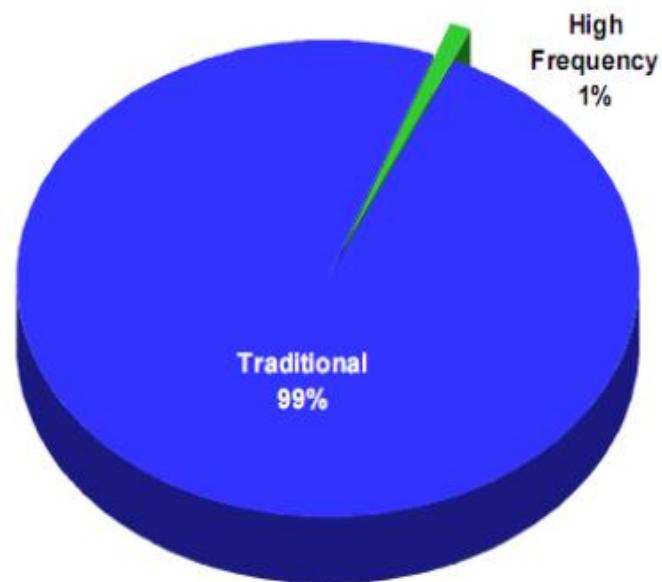
HFT er en undergruppe innen algoritmisk handel som skal generere små men forutsigbare gevinster på stort volum. Typisk kjennetegn er høy omløpshastighet på egenkapital, tidshorisont fra millisekund til timer og med ekstremt høy ordregenereringskapasitet.
***Oslo Børs***

HTF aktørene – og deres andel
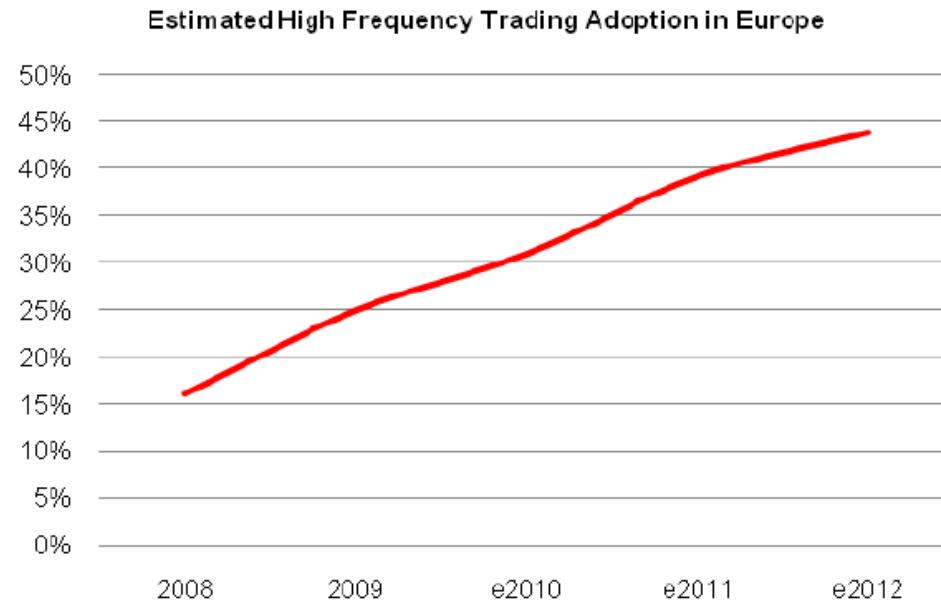
Percent of US trading firms with a high frequency strategy / Percent of US equity volume driven by high frequency strategies

High Frequency 1%

Traditional 99%

Traditional 34%

High Frequency 66%

Source: TABB Group Estimates- High Frequency Trading Technology, 2009

HFT andel av handel i Europa

Growth of high frequency trading in Europe

Estimated High Frequency Trading Adoption in Europe

Source: Aite Group

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Typiske trading strategier – ikke ulikt andre aktører

Liquidity Provision

Rebate Trading
Provide liquidity in stocks by posting bids and offers in order to collect ECN rebates without requiring capital Gains

Characteristics:
• Most prevalent in higher volume, lower volatility stocks
• Tolerates small trading losses

•**Example:**
• Post bid to buy shares, upon execution immediately post offer on the inside market to sell position thus capturing rebate from ECN with or without capital gain.

Trading the Tape

Filter Trading
Monitor for stocks that show significant changes in movement and/or volume

Characteristics:
• Constant monitoring of thousands of stocks for mechanical signs of announcements, rumors, news items
• Identifies stocks that meet a threshold level of variance in the rate of change of price action and/or volume and buys/sells accordingly

Examples:
• News story causes spike in price and large jump in volume, algorithm rapidly buys
• Algorithm recognizes a major uptick in the pace of the bid being hit and shorts stock until pace declines

Statistical Trading

Statistical Arbitrage
Exploit pricing differentials between correlated securities and markets

Characteristics:
• Often uses multiple exchanges and various asset classes
• Defines maximum range of variance and takes counter trade when that range is exceeded

Examples:
• Derivative prices and the underlying asset call option and the stock)
• Exchange-traded funds against the holdings
• Highly correlated stocks (Pepsi and Coca-Cola)
• Companies and their input resources (Gold miners and gold commodity)

Technical Trading

Technical Trading
Discover technical setups based on pre-defined recurring patterns in stocks prices

Characteristics:
• Select stocks that fit particular technical patterns that have been shown to create favorable risk-to reward opportunities
• Entries and exits are precisely defined price points based on rules of technical analysis

Examples:
• Track stocks crossing 5-day moving average and buy or sell on cross and close position after pre-defined profit objective is met

Market Making

Market Making
Regulatory exemption to reduce spreads by creating a more liquid market

Characteristics:
• Profit earned from the spread between the bid and off as well as rebates for providing liquidity

Examples:
• Designated market makers (DMMS) with obligation to maintain an orderly market by providing a required amount of liquidity in specific stocks
• Supplemental Liquidity Providers obligated to maintain the national best bid or offer 5% of the trading day

Momentum Trading

Momentum Trading
Identify temporary supply-demand imbalances and trade with short-term momentum as equilibrium is Restored

Characteristics:
• Can overlap with filter trading style
• Typically very rapid entry and exit of stock attempting to extract small capital gains

Examples:
• Detect large buying interest creating imbalance, buy shares and hold until price is reached where selling pressure creates equilibrium and price action stalls

Algo utvalget er betydelig

Angler

Raider

Float

Raider

Pilot

Volare

Shark

Iceberg

Spread Trader

Active

Pilot

Shark

Volatility Trader

VWAP

Hunt

Dark List

Shadow

Recoil[SM]

Dark Probe

Dynamic Scaling

TWAP

Work and Pounce

Cobra

T-HAWK[SM]

Adrenaline[SM]

Pounce

Dagger

Rapid

Delta Adjusted

Reload

OptimIS

Small Order

Scaler

Stealth

City Match

Smart Iceberg

Crossfire

Discretion

Buyback

Sonar

Time Trigger

Smart Pegging

Implementation Shortfall

Exit

Pivot

Delta Hedge

Spotlight

Escalate

ESP Cloak

Prowler

Nighthawk

LMX Hydra

Spread (Pairs) Trading

Market on Close

Scaling

Strict Volume Percent

Synthetic Execution

PortX

Percent of Volume

Midmax

Piccolo

Alpha
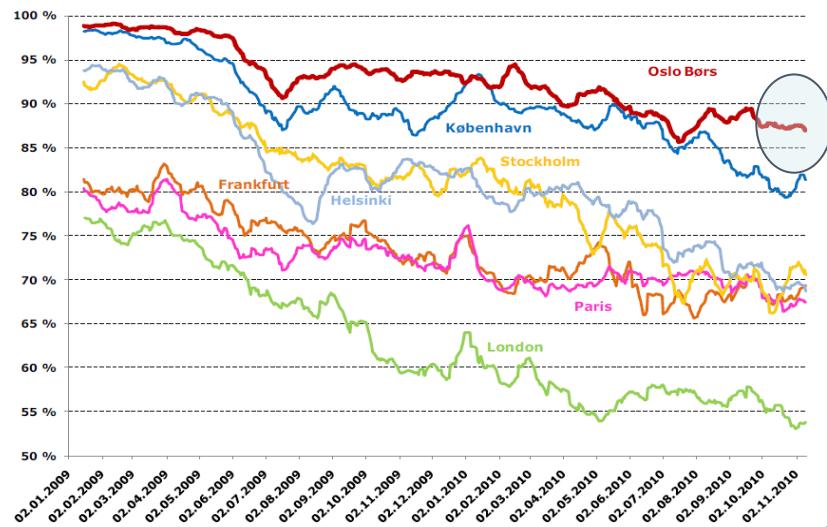
Statistical Arbitrage

Synthetic Close

Arid

Slicer

Navigator

Priority

Swoop

Strategy

Fan

12

Fragmentering – Status og forventet utvikling

Markedsandeler Børser
10 dagers glidende gjennomsnitt
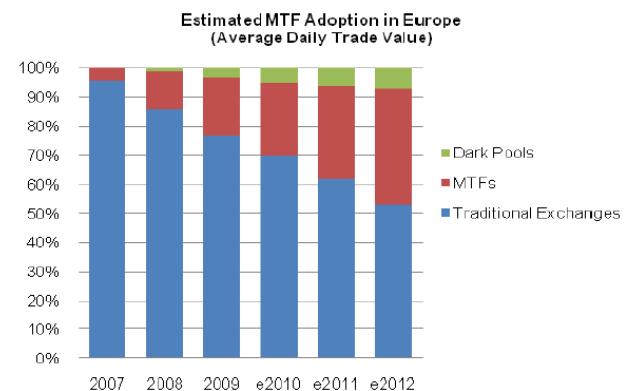
NYSE Matched Market Share

Growth in alternative venues

Source: Aite Group
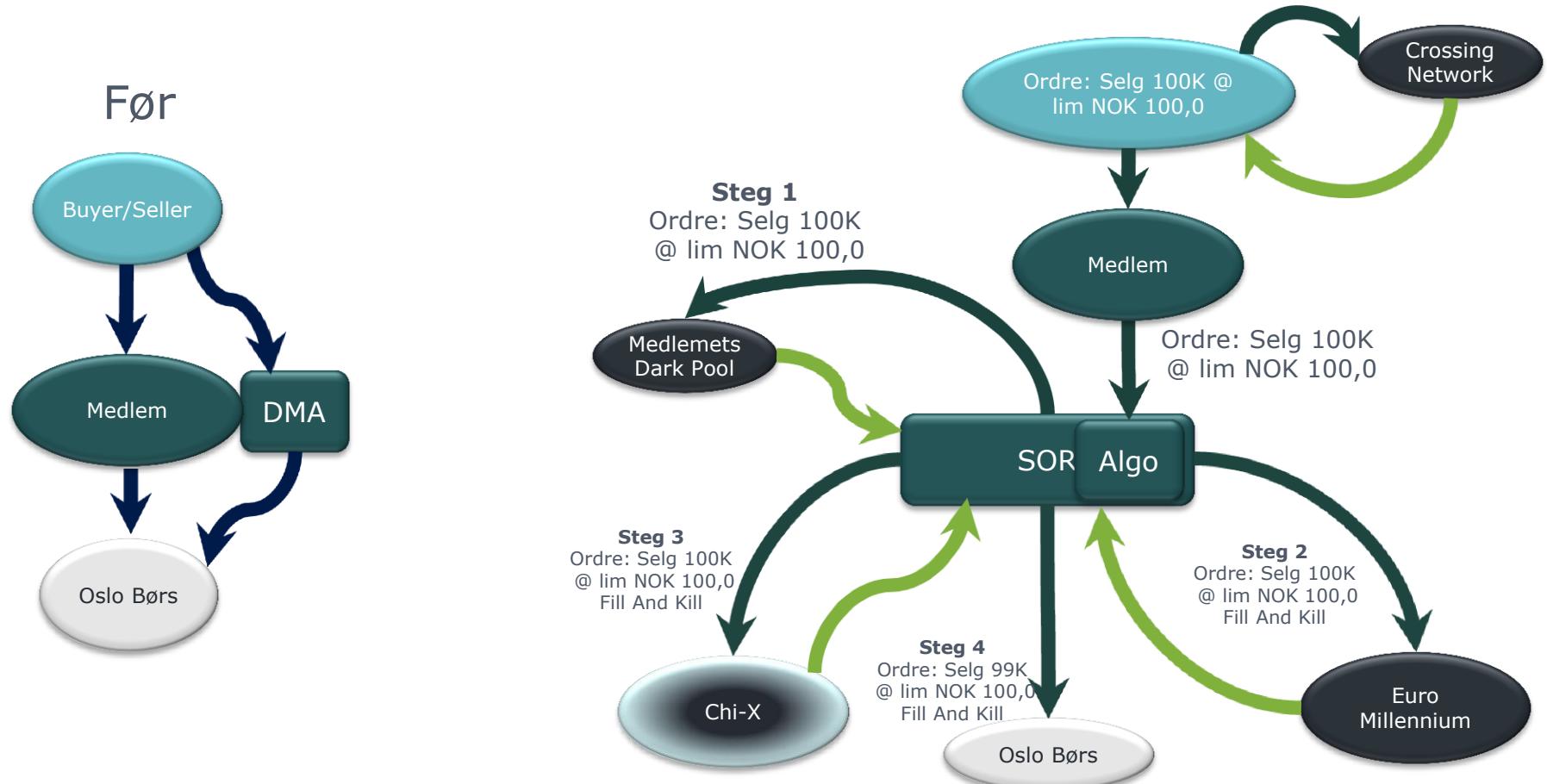
- **Direktiver**
- Europa - MIFID (Nov 2007)
- USA - Reg NMS (2005)

- **Teknologi**
- Avanserte algoritmer
- Smart Order Routing
- Nye konkurranseparametre

Smart Order Routing – en sentral del av utviklingen

Før

Steg 1
Ordre: Selg 100K
@ lim NOK 100,0

Ordre: Selg 100K @ lim NOK 100,0 (Crossing Network / Medlem)

Ordre: Selg 100K @ lim NOK 100,0

Steg 3
Ordre: Selg 100K
@ lim NOK 100,0
Fill And Kill

Steg 4
Ordre: Selg 99K
@ lim NOK 100,0
Fill And Kill

Steg 2
Ordre: Selg 100K
@ lim NOK 100,0
Fill And Kill

Chi-X			
BID		ASK	
Volum	Pris	Pris	Volum
1000	100,0	100,1	3 000
Kan være skjult volum også			

Oslo Børs			
BID		ASK	
Volum	Pris	Pris	Volum
25 000	100,0	100,1	3 000
25 000	99,9	100,2	17 000
50 000	99,8	100,3	25 000

Euro Millennium			
BID		ASK	
Volum	Pris	Pris	Volum

# Noen konsekvenser av utviklingen
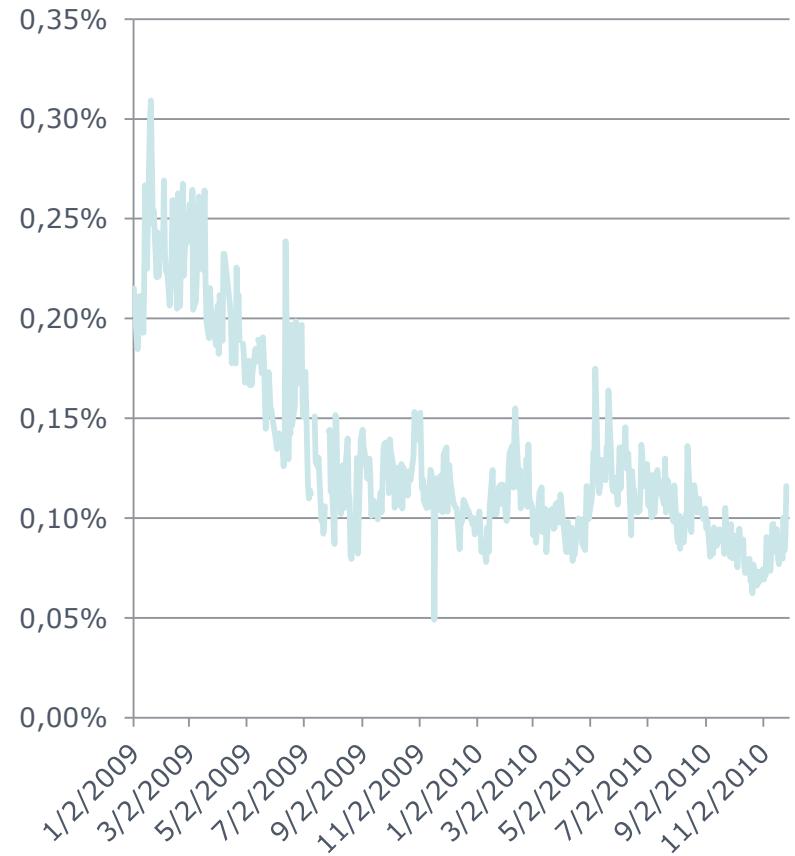
- Tick size tabell – relativ spread
  - Endringene sommeren 2009
  - FESE sin harmonisering

- Fjerning av "lot size" og "odd-lot"

- Orders to trade ratio

- Antall handler øker – gjennomsnittligverdi faller

- Fokus på 'post trade' kostnader – CCP

# *Spread faller, men hva med likviditeten...*

**Spread Yara**

Spread Seadrill

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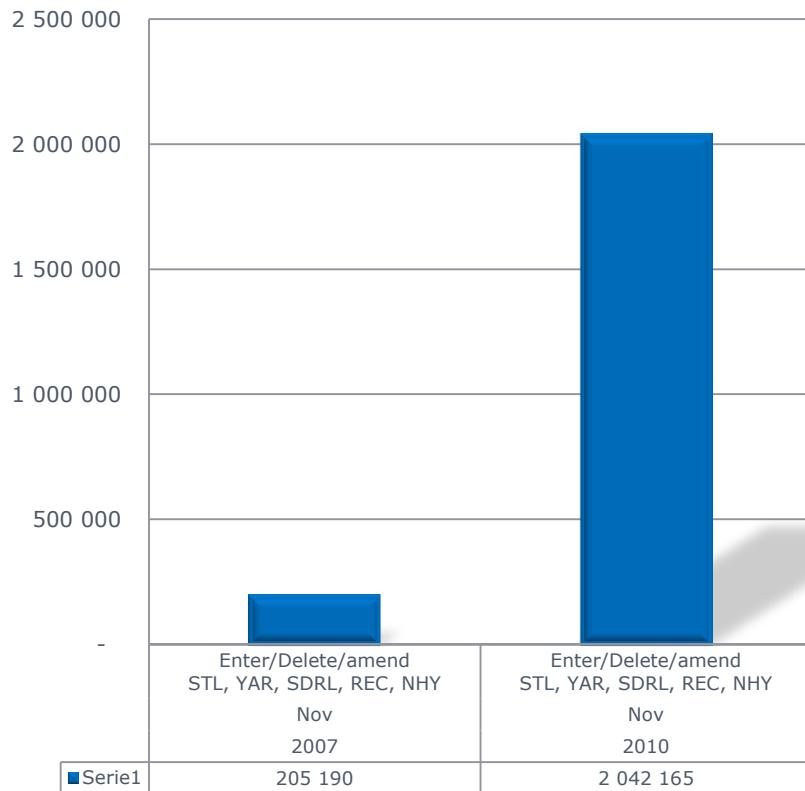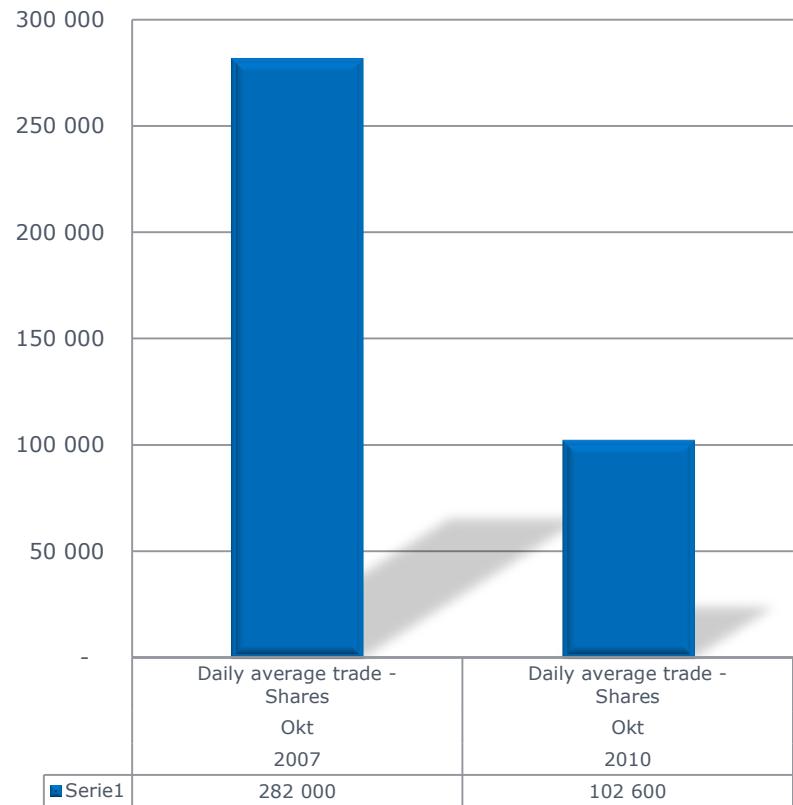
Ordreaktivitet og snittverdi av utførte handler

Ordreaktivitet

	Enter/Delete/amend STL, YAR, SDRL, REC, NHY Nov 2007	Enter/Delete/amend STL, YAR, SDRL, REC, NHY Nov 2010
Serie1	205 190	2 042 165

Snitt verdi per handel

|	Daily average trade - Shares Okt 2007	Daily average trade - Shares Okt 2010
Serie1	282 000	102 600
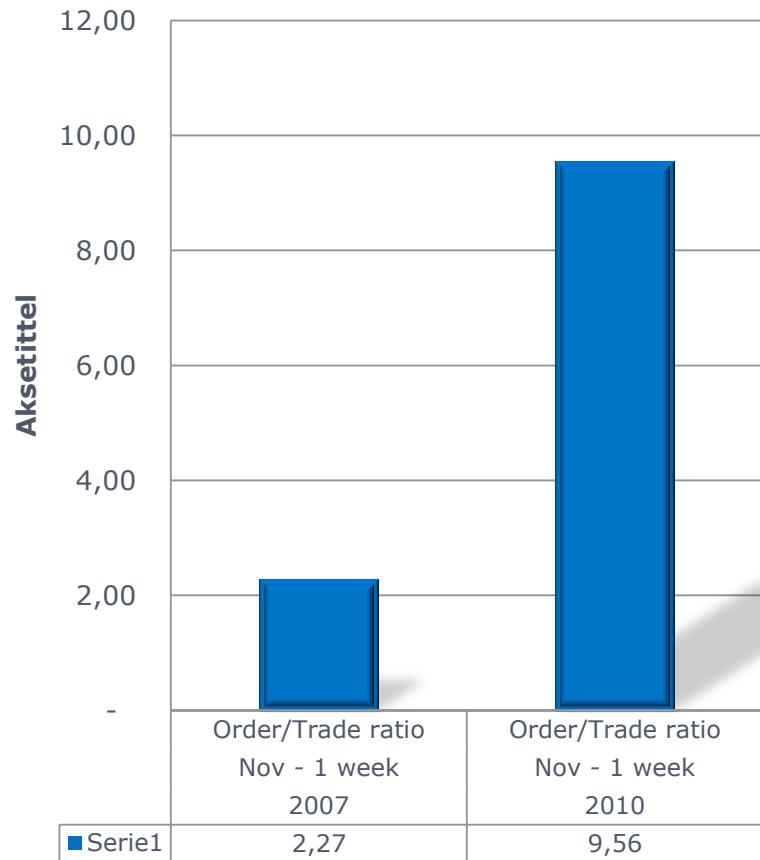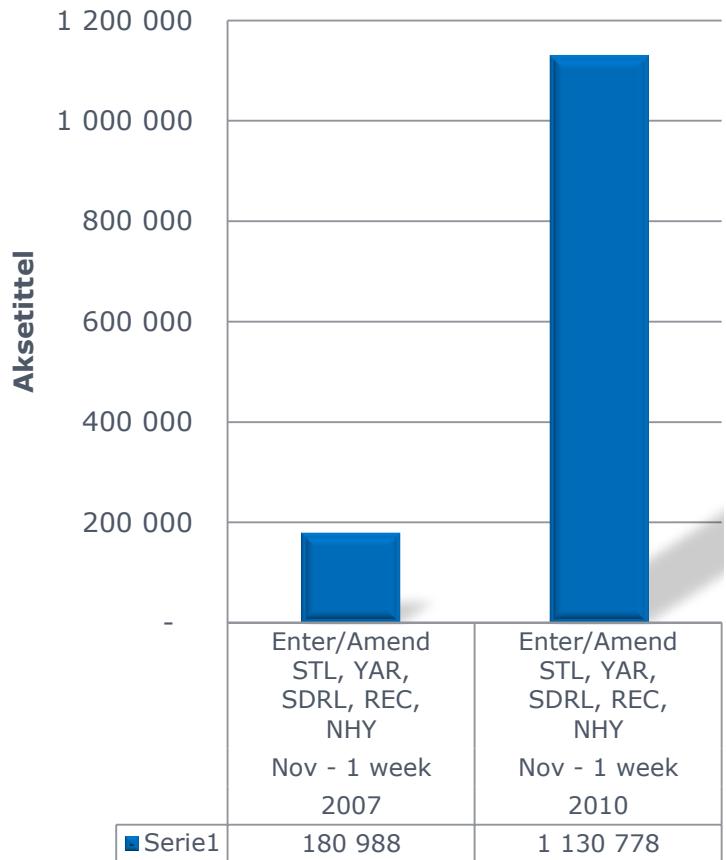
Ordre pr handel og ordreaktivitet

Order/Trade Ratio

	Order/Trade ratio Nov - 1 week 2007	Order/Trade ratio Nov - 1 week 2010
■ Serie1	2,27	9,56

Aksetittel

Enter/Amend

|	Enter/Amend STL, YAR, SDRL, REC, NHY Nov - 1 week 2007	Enter/Amend STL, YAR, SDRL, REC, NHY Nov - 1 week 2010
■ Serie1	180 988	1 130 778

Aksetittel

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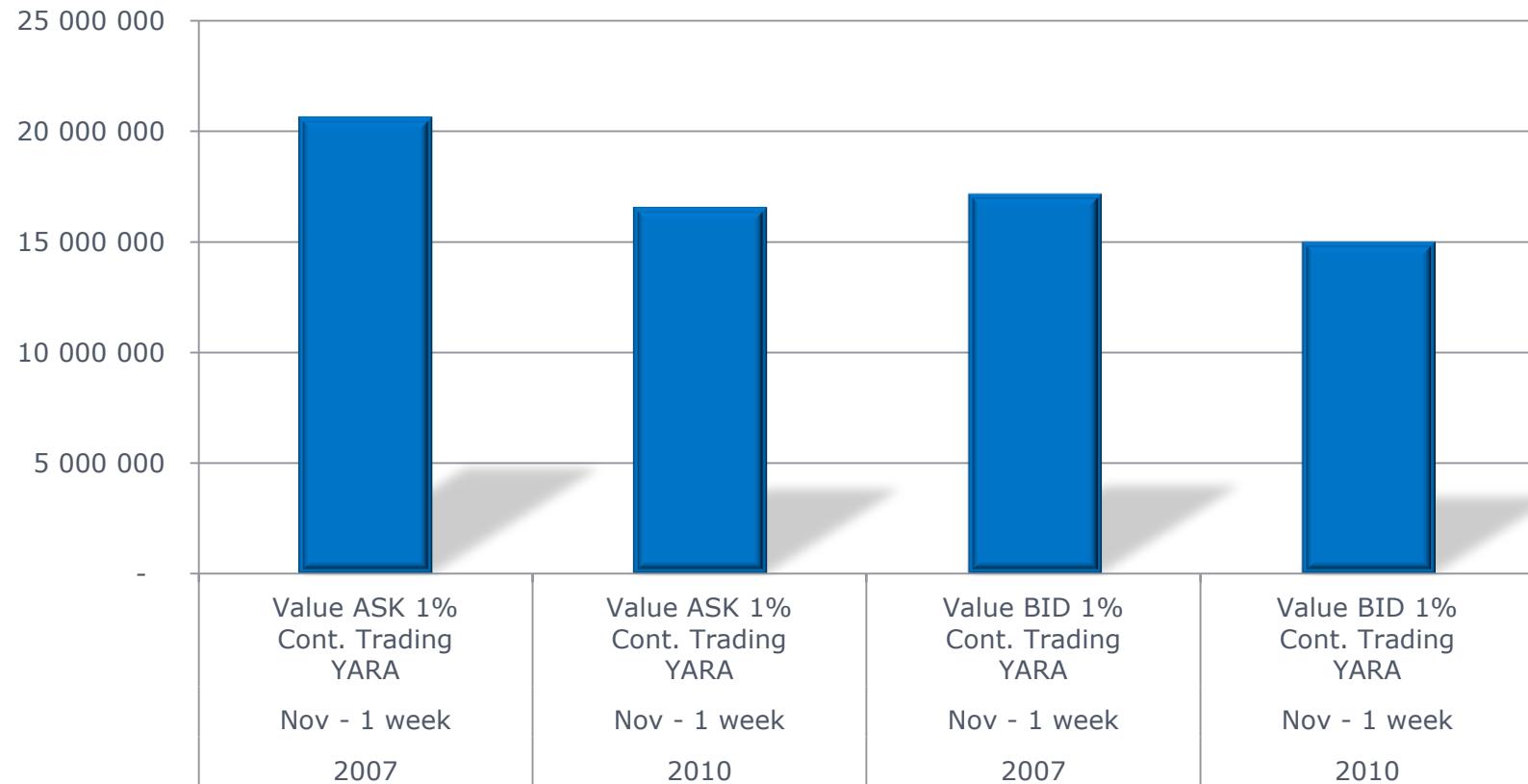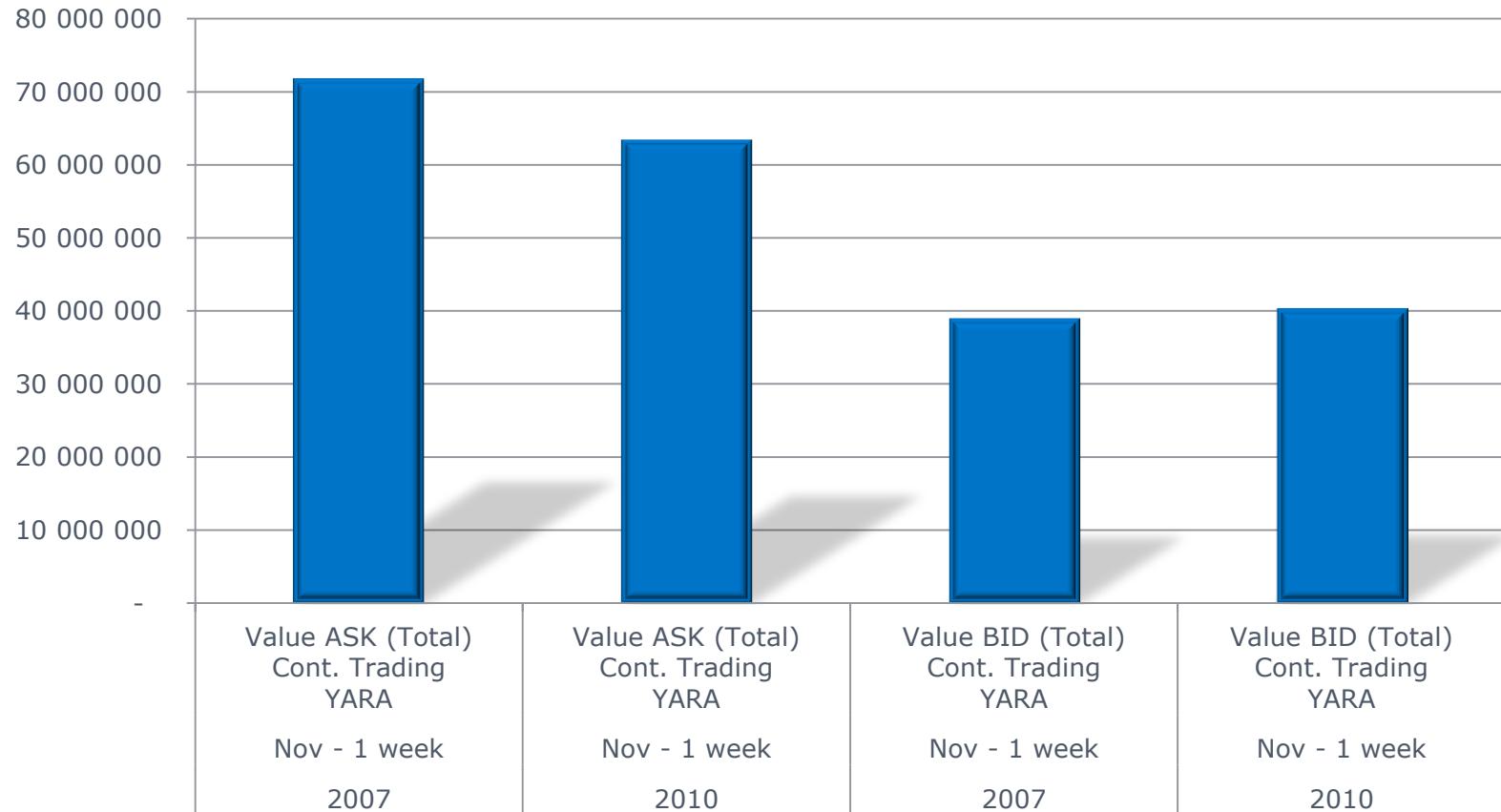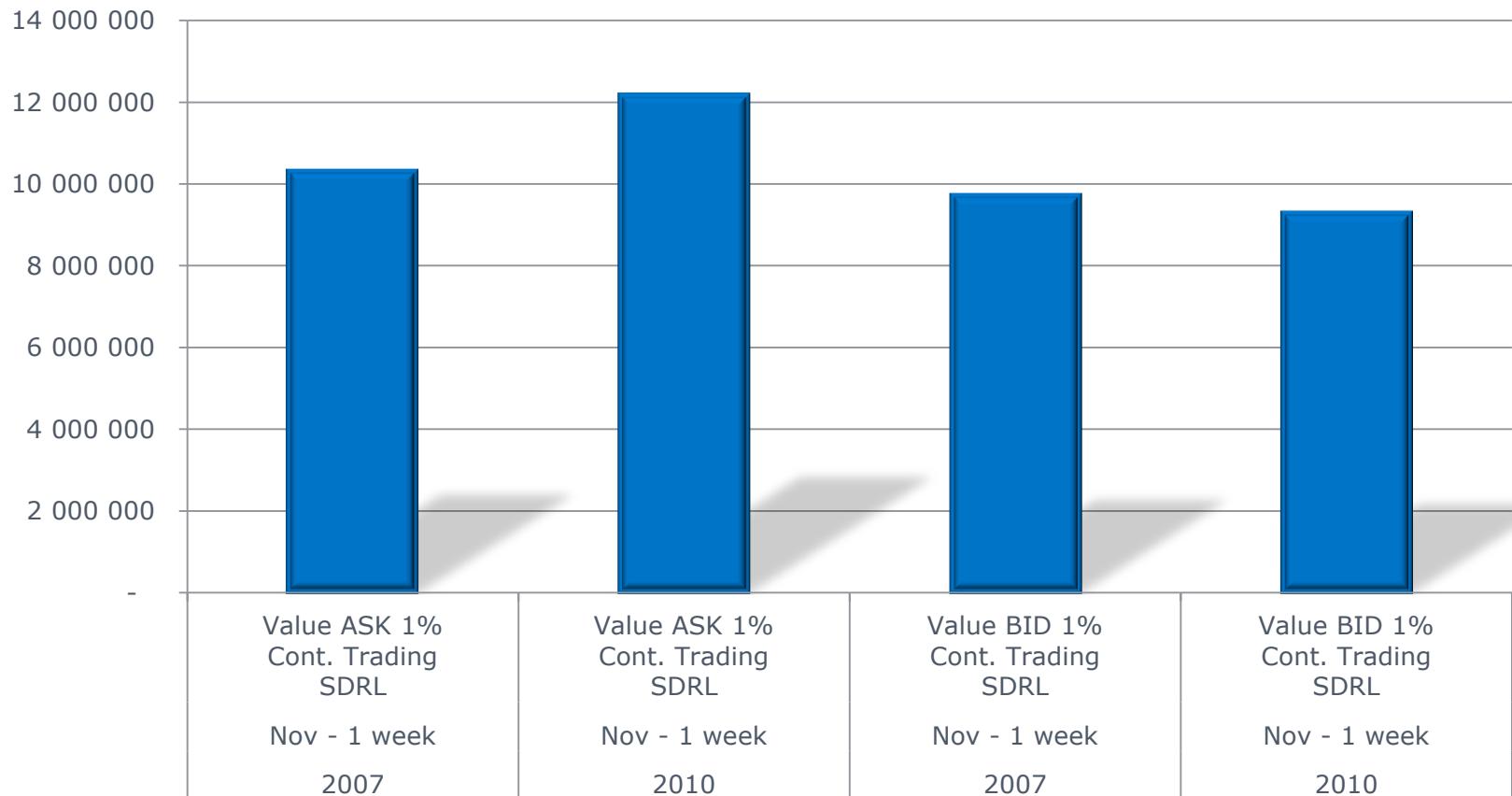
# YARA - Tilgjengelig verdi i ordrebok - fra beste nivå til 1%
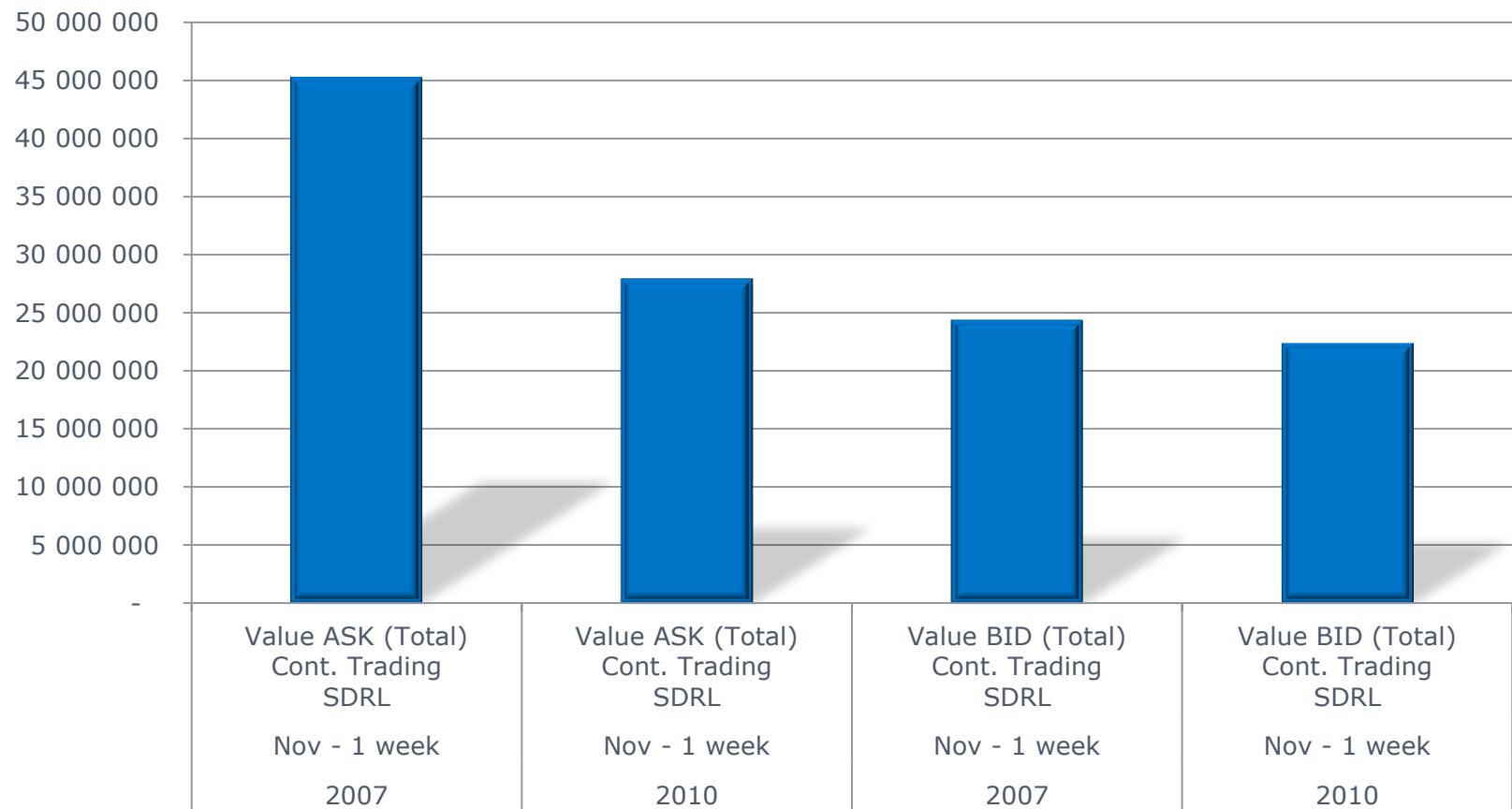
YARA - Tilgjengelig verdi i ordrebok - totalt

SDRL - Tilgjengelig verdi i ordrebok - fra beste nivå til 1%

SDRL - Tilgjengelig verdi i ordrebok - totalt

Oppsummering

- Ordreaktivitet "eksploderer"

- Gamle strategier blir "nye" gjennom algoritmer
  - Handle på andres aktivitet ("Frontrunning")
  - Prisdifferanse strategier

- Nye handelsstrategier oppstår

- Konkurransen virker
  - Handelen blir mer fragmentert
  - Markedsstruktur blir konkurranseparameter

- Utviklingen preger debatten i EU og USA
  - "Alle" skal utrede konsekvensene
  - Ulike varianter av regulering diskuteres

- Flere regulatoriske utfordringer

"Maskiner har kommet for å bli"