

Financial Markets

Lecture Notes Week 1

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This Week: Basics of Securities Trading

Players in securities markets

Quotes & orders

Trading mechanics in limit order markets

Players in Securities Markets

“Buy” side: parties who **demand** trading services

“Sell” side: parties who **supply** trading services

Players in Securities Markets

“Buy” side: parties who **demand** trading services

- ▶ individuals (retail)
- ▶ institutions (wholesale): mutual funds, pension funds, corporates, ...

Players in Securities Markets

“Sell” side: parties who **supply** trading services

- ▶ market makers (aka dealers, liquidity providers):
 - ▶ quote prices at which they are willing to trade
 - ▶ in doing so, they provide **liquidity & immediacy**
 - ▶ absorb orders into their inventories, **take risk**
- ▶ brokers: trade on behalf of clients, send orders to exchanges, do not trade themselves
- ▶ broker-dealers: do both

What do these MMs have in common?

optiver   imc

F L O W ■ T R A D E R S

 All Options

 ROCA MARKETS

 KEMPEN & CO

What do market makers do? IMC

“IMC Financial Markets is a global market maker that employs advanced technology and highly skilled traders to buy and sell securities covering all major asset classes, and is also a Designated Market Maker on the New York Stock Exchange. Market makers provide liquidity and thereby improve market efficiency.”

www.imc.com/eu/about-us#what-we-do

What do brokers do? Charles Schwab

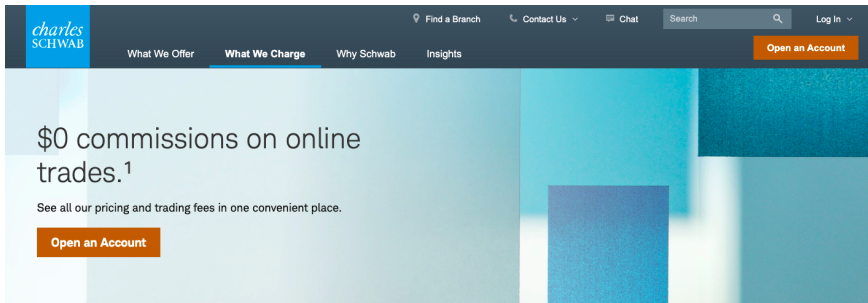
The screenshot displays the Charles Schwab website's navigation and service categories. The top navigation bar includes the Charles Schwab logo, a search bar, and links for 'Find a Branch', 'Contact Us', 'Chat', and 'Log In'. Below this, a secondary navigation bar highlights 'What We Offer', 'What We Charge', 'Why Schwab', and 'Insights', with an 'Open an Account' button on the right.

The main content area is organized into a grid of service categories:

- ACCOUNTS**
 - All Accounts
 - Brokerage and Trading
 - Retirement and IRAs
 - Global Trading
 - Trust, Estate and Charitable
 - Education and Custodial
 - Organizational Account
 - Personal Choice Retirement Account
- RETIREMENT**
 - How much do you need to retire?
 - Retirement Income Solutions
 - Schwab Intelligent Income®
- INVESTMENT PRODUCTS**
 - All Investment Products
 - Mutual Funds
 - ETFs
 - Index Funds and ETFs
 - Stocks
 - Schwab Stock Slices™
 - Bonds, CDs and Fixed Income
 - Money Market Funds
 - Annuities
 - Cash Solutions
 - Margin Lending
 - Options
 - Futures
 - Global Investing
 - Socially Responsible Investing
- INVESTMENT MANAGEMENT**
 - Our Investment Management Offerings
 - AUTOMATED INVESTING WITH GUIDANCE**
 - Schwab Intelligent Portfolios®
 - Schwab Intelligent Portfolios Premium®
 - CUSTOMIZED INVESTMENT MANAGEMENT**
 - Schwab Private Client™
 - Schwab Advisor Network®
 - ADDITIONAL SOLUTIONS**
 - Schwab Managed Portfolios™
 - Managed Account Select®
 - ThomasPartners® Strategies
 - Windhaven® Strategies
- TRADING**
 - Trading at Schwab
 - Trade Pricing
 - Trading Platforms and Tools
 - Trading Specialists
- FINANCIAL PLANNING**
 - How to Reach Your Goals
 - Calculators and Tools
 - Complimentary Plan
- INVESTMENT RESEARCH**
 - Research
 - Expert Fund Picks
- BANKING AND BORROWING**
 - Bank Offerings
 - Checking
 - Savings
 - Home Loans and Rates
 - Pledged Asset Line
 - Strategic Borrowing
- SPECIALIZED SOLUTIONS**
 - Small Business
 - Credit Cards
 - Personal Trust Services
 - Insurance

At the bottom, three large buttons are visible: 'Stocks and ETFs', 'Options', and 'Mutual Funds'.

How do brokers make money?



The image shows the top section of the Charles Schwab website. The header is dark blue with the Charles Schwab logo on the left. Navigation links include 'Find a Branch', 'Contact Us', 'Chat', 'Search', and 'Log In'. Below the header, there are tabs for 'What We Offer', 'What We Charge' (which is selected), 'Why Schwab', and 'Insights'. An orange 'Open an Account' button is on the right. The main banner has a light blue background with the text '\$0 commissions on online trades.¹' and 'See all our pricing and trading fees in one convenient place.' with another orange 'Open an Account' button.

charles SCHWAB

Find a Branch Contact Us Chat Search Log In

What We Offer **What We Charge** Why Schwab Insights

\$0 commissions on online trades.¹

See all our pricing and trading fees in one convenient place.

Open an Account

\$0

Stocks and ETFs
online commission^{1,2}

\$0

Options
online base commission + \$0.65 per contract
fee³

\$0

Mutual Funds
on thousands of funds from Schwab Mutual
Fund OneSource⁴

How do brokers make money?

1. Luring customers into high-fee products ...
 - ▶ e.g, leverage, CfDs, crypto (e.g., eToro, Trading 212)
2. Lending out shares to short-sellers
3. “Payment for order flow:” directing order flow to other parties for execution (and being paid for it)

Brokers: Price Improvement

Trader Offering

Investing Web Platforms

thinkorswim Trading Platforms

Mobile Trading Apps

Compare Platforms

24/5 Trading

Order Execution

Get in touch
Call or visit a
branch

Call us: 800-454-9272

250+ Branches Nationwide

City, State, Zip

Go

**Now introducing
commission-free
online trading.**

Applies to US exchange
listed stocks, ETFs, and
options. A \$0.65 per
contract fee applies for
options trades. A \$6.95

April - June 2020

TD Ameritrade uses advanced routing technology and evaluates execution quality, mindful of what matters most to our clients.

[Open new account](#)

You Want a Better Price

The vast majority of market orders executed receive a price better than the nationally published quote.

Percentage of orders price improved



96.1%

Percentage of orders price improved: Executed market orders receiving price(s) better than the National Best Bid/Offer (NBBO) at the time of routing, divided by the total number of orders executed.

Note: Shares executed at market quote or better (%) is 97.5%

You Want to Save Money

Price improvement provides significant savings.

Net improvement per order



\$2.11 (per 100 shares)

Net improvement per order: Net price improvement per share (\$0.0211) in the order size range comprising the vast majority of our clients' market orders (1-1,999), multiplied by 100 shares. Total net price improvement by order will vary with order size.

You Want Your Entire Order Filled

You Want Your Order Filled Fast



DOW ▲ 27,974.39+287.48 (1.04%)

NASDAQ ▲ 10,887.324+104.5 (0.97%)

S&P 500 ▲ 3,365+31.31 (0.94%)

[Open New Account](#)

Quotes: Airbus 17/08/2021, 14:22

Latest	€ 112,96	Last Deal	17/08/2021 14:22
Volume	301.169	Vol 10D Avg	974.850
Bid	112,94	Ask	112,96
Bid Vol.	609	Ask Vol.	113
+/-	-1,66	+/- %	-1,45%
Low	112,96	High	113,96
Open	113,94	Close	114,62
YTD +/-%	+27,67%	Vol 3M Mth. Avg	32.273.650
12M Low	57,87	12M High	121,00
<hr/>			
Symbol	AIR	ISIN	NL0000235190
Shrs Floating	582,468M	Exchange	Euronext Paris
Shrs Outst	785,783M		

Quotes: Airbus 17/08/2021, 14:22

?	Bid Vol.	Bid (€)	Ask (€)	Ask Vol.	
11	609	112,94	112,96	113	3
6	292	112,92	112,98	416	9
22	2.130	112,90	113,00	429	10
14	1.577	112,88	113,02	617	11
10	1.652	112,86	113,04	1.233	13
8	1.676	112,84	113,06	568	8
4	191	112,82	113,08	425	8
22	958	112,80	113,10	566	6
4	388	112,78	113,12	2.588	9
8	493	112,76	113,14	605	8

“Take” or “Make”

Latest	€ 112,96	Last Deal	17/08/2021 14:22
Volume	301.169	Vol 10D Avg	974.850
Bid	112,94	Ask	112,96
Bid Vol.	609	Ask Vol.	113

We wish to buy 100 Airbus shares. We can either:

- ▶ Offer 112.96 (or more)
- ▶ Offer 112.95 (or less)

What's the tradeoff?

“Take” or “Make”

- ▶ Market orders:
 - ▶ instruction to trade at the best currently available price
 - ▶ immediate execution vs. price uncertainty
- ▶ Limit orders:
 - ▶ instruction to trade at best price available provided that it is no worse than the specified limit price
 - ▶ advantage: better price, possibly
 - ▶ disadvantage:
 - ▶ non-execution, cost of delay
 - ▶ adverse selection / picking-off risk: smarter & faster traders may trade against you precisely when you would have preferred to cancel or revise your order

Order Book at Market Opening (9.30)

Bid (buy orders)		Ask (sell orders)
	103	2000
	102	7000
	101	15000
1000	100	
12000	99	
4000	98	
4000	97	

- ▶ best bid: 100, best ask: 101
- ▶ “bid-ask spread” = 1
- ▶ midpoint: 100.5
- ▶ relative spread: $1/100.5 = 0.995\%$

9:31: Sell 500 shares, market

Bid (buy orders)		Ask (sell orders)
	103	2000
	102	7000
	101	15000
1000	100	
12000	99	
4000	98	
4000	97	

9:31: Sell 500 shares, market

Bid (buy orders)		Ask (sell orders)
	103	2000
	102	7000
	101	15000
1000 - 500 = <u>500</u>	100	
12000	99	
4000	98	
4000	97	

- ▶ bid-ask spread not altered
- ▶ market “depth” ↓ (bid side became “thinner”)
- ▶ market order “takes” / “consumes” liquidity

9:32: Buy 4500 shares, limit 100

Bid (buy orders)		Ask (sell orders)
	103	2000
	102	7000
	101	15000
500	100	
12000	99	
4000	98	
4000	97	

9:32: Buy 4500 shares, limit 100

Bid (buy orders)		Ask (sell orders)
	103	2000
	102	7000
	101	15000
$500 + 4500 = 5000$	100	
12000	99	
4000	98	
4000	97	

- ▶ spread again not altered; market depth ↑
- ▶ limit order “makes” / “provides” liquidity

9:33: Sell 8000 shares, market

Bid (buy orders)		Ask (sell orders)
	103	2000
	102	7000
	101	15000
5000	100	
12000	99	
4000	98	
4000	97	

9:33: Sell 8000 shares, market

Bid (buy orders)		Ask (sell orders)
	103	2000
	102	7000
	101	15000
5000 - 5000 = 0	100	
12000 - <u>3000</u> = 9000	99	
4000	98	
4000	97	

- transaction price:

$$(5000 \times 100 + \underline{3000} \times 99) / \underline{8000} = \underline{99.63} < 100$$

9:33: Sell 8000 shares, market

Bid (buy orders)		Ask (sell orders)
	103	2000
	102	7000
	101	15000
5000 - 5000 = 0	100	
12000 - 3000 = 9000	99	
4000	98	
4000	97	

- ▶ transaction price:

$$(5000 \times 100 + 3000 \times 99) / 8000 = 99.63 < 100$$

- ▶ in the absence of the limit buy order at 9.32:

$$(500 \times 100 + 7500 \times 99) / 8000 = 99.06 < 99.63$$

9:34: Sell 4000 shares, limit 99

Bid (buy orders)		Ask (sell orders)
	103	2000
	102	7000
	101	15000
	100	
9000	99	
4000	98	
4000	97	

9:34: Sell 4000 shares, limit 99

Bid (buy orders)		Ask (sell orders)
	103	2000
	102	7000
	101	15000
	100	
$9000 - 4000 = 5000$	99	
4000	98	
4000	97	

- ▶ limit order is marketable: executed immediately
- ▶ so why not market order?

Latency

- ▶ just before our order, a market sell order for 13000 shares arrives:

Bid (buy orders)		Ask (sell orders)
	103	2000
	102	7000
	101	15000
	100	
9000	99	
4000	98	
4000	97	

- ▶ other traders will be faster than you!
 - ▶ faster at accessing and processing information
 - ▶ faster at submitting and cancelling orders

An Order Book Imbalance

Bid (buy orders)		Ask (sell orders)
	103	2000
	102	7000
	101	15000
	100	
	99	
	98	
4000	97	

Fresh liquidity is supplied!

Bid (buy orders)		Ask (sell orders)
	103	2000
	102	7000
	101	15000
	100	
	99	
+ 4000	98	
4000 + 1000 = 5000	97	

Who makes liquidity?

- ▶ Dealers having contractual relationship with exchange and/or issuer obliging them to provide minimum levels liquidity, e.g.,
 - ▶ NYSE: "Designated market makers"
 - ▶ Euronext: "Liquidity providers"
- ▶ Other dealers/market makers (can) provide liquidity too, but they have no obligation to do so
- ▶ Other professionals, e.g., high-frequency traders
- ▶ ANYBODY submitting a (non-marketable) limit order or quote!

More liquidity is supplied

Bid (buy orders)		Ask (sell orders)
	103	2000
	102	7000
	101	$15000 - 8000 = 7000$
	100	$+ 8000$
	99	
4000	98	
5000	97	


Even more liquidity is supplied

Bid (buy orders)		Ask (sell orders)
	103	2000
	102	7000
	101	7000
	100	$8000 + 2000 = 10000$
	99	$+ 5000$
4000	98	
5000	97	

9:36: Buy 16000 shares, limit 100

Bid (buy orders)		Ask (sell orders)
	103	2000
	102	7000
	101	7000
	100	10000
	99	5000
4000	98	
5000	97	

9:36: Buy 16000 shares, limit 100



Bid (buy orders)		Ask (sell orders)
	103	2000
	102	7000
	101	7000
1000	100	
	99	
4000	98	
5000	97	

- ▶ order is partially filled
- ▶ non-marketable part is added to the LOB


9:36: Buy 16000 shares, limit 100, IOC

Immediate or cancel: non-marketable part is cancelled

Bid (buy orders)		Ask (sell orders)
	103	2000
	102	7000
	101	7000
	100	10000
	99	5000
4000	98	
5000	97	

9:36: Buy 16000 shares, limit 100, IOC

Immediate or cancel: non-marketable part is cancelled



Bid (buy orders)		Ask (sell orders)
	103	2000
	102	7000
	101	7000
	100	10000-10000=0
	99	5000-5000=0
4000	98	
5000	97	

15,000 shares are traded

why? limit

9:36: Buy 16000 shares, limit 100, FOK

Fill or kill execute entire order or cancel

Bid (buy orders)		Ask (sell orders)
	103	2000
	102	7000
	101	7000
	100	10000
	99	5000
4000	98	
5000	97	

No shares are traded

9:36: Buy 14000 shares, limit 100, FOK

Fill or kill: execute entire order or cancel

Bid (buy orders)		Ask (sell orders)
	103	2000
	102	7000
	101	7000
	100	$10000 - 9000 = 1000$
	99	$5000 - \underline{5000} = 0$
4000	98	
5000	97	

14,000 shares are traded

Key Concepts

- ▶ Brokers vs dealers
- ▶ Limit orders vs market orders
- ▶ Trading mechanics in limit order markets
- ▶ Limit orders “make ” liquidity
- ▶ Market orders “take” liquidity

Next Week: More on Market Liquidity

The 3 dimensions of market liquidity

Measuring liquidity in practice

Amihud's (2002) illiquidity measure

Roll's (1984) bid-ask spread estimator