

Financial Economics

Lecture 5

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February 8, 2010

Agenda

Last Time: Real markets

- 1 Order types (margin calls/short selling/etc)
- 2 Limit orders

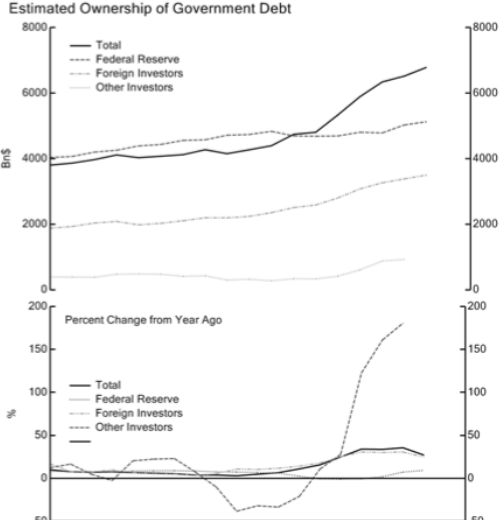
This time:

- 1 More on Limit orders and market making
- 2 profit and loss in market making
- 3 a continuous market example
- 4 Limits to markets

In the news: Debt, destroyer of worlds.

[Source: <http://www.boeckhinvestmentletter.com/>]

Chart 1& 2



In the news

[

see <http://finfacts.com>]

- 1 Global banking levy
- 2 Asia will be responsible for 60% of world growth in 2010

Part I

Limit Order Markets

Limit Order Markets

Definition (Limit Order)

A limit order is a precommitment (t, j, x, p) made on a date t to trade up to a given amount x of some asset j at a limit price p .

Limit Orders very important

Limit and market orders constitute the core of any order-driven continuous trading system (eg NYSE, London Stock Exchange, Euronext, Tokyo and Toronto Stock Exchanges, as well as all the ECNs)

Issues with limit orders

- 1 Inventories/Waiting costs matter, might lead to uncertainty
- 2 Imposes a queuing discipline: “first in, first out”. That rewards first-movers providing liquidity at a given price.
- 3 Idealised supply and demand markets, but microstructure of actual markets really matters.

Example

Price	D(P)	Priority	LO(B)	LO(S)	Priority	S(P)
>46	0	0	0	1	0	5
46	0	0	0	1	5	5
45	1	1	1	1	4	4
44	2	2	1	1	3	3
43	3	3	1	1	1	1
42	5	5	2	1	0	0
<41	0	0	0	0	0	0

In Class-Exercise

Graph supply and demand for this example. Work out equilibrium P and Q. Now consider how order size differences might change prices.

Another Example. In Class exercise.

Consider this limit order market.

Price	Limit Order Buy	Limit Order Sell.
=49	1	0
=48	1	0
47	0	0
46	0	0
45	0	0
44	0	0
43	0	1
42	0	1

Questions

Graph $S(P)$ and $D(P)$. What are possible match price points/sizes? What do you think is the fairest match point price? Is an ambiguity rule needed? Can you see any opportunities for rogue-traders? Repeat the problem for $LO(B)=1$, replaced by $LO(B)=2$ at $p=48$.

Market Making

Definition

Dealer makes a market if at a point in time he gives a firm bid quote (P_b, Q_B) and an offer quote (P_o, Q_o). $P_b - P_o$ is called the spread. 'Firm' means he will make trades at those prices. He will get an inventory as a result.

Example

Dealer trades stock *A* between 20-25. He'll buy at 20, sell at 25, and he'll quote you order sizes. Dealer 'makes' the market. Market maker needs 1) CASH and 2) INVENTORY and 3) LIMITS.

Note

You can see immediately that the Central Bank in modern financial systems is the final 'market maker' or lender of last resort, guaranteeing liquidity in the system.

Market Making: Principles and Profit

- ① Central bank: makes market in various securities/money itself
- ② MM must have cash and inventory if they are to sell anything
- ③ Also upper and lower limits on trade size and debt-levels
- ④ To make money:
 - ① Keep the market open
 - ② look constantly at inventories
 - ③ stay away from predetermined limits
- ⑤ Profit of MM: surplus inventory of cash.
- ⑥ Profit is incidental byproduct of activity→liquidity.

Limit orders and probability

An interesting confluence

It turns out price and time priority of a limit order translate directly into a probability distribution over execution timing and liquidity. We can use probability to understand these markets. That's next lecture.

Part II

Econophysics

Econophysics

[See: <http://tinyurl.com/ec40241>]

- ① Eugene Wigner: Invariance Laws, non-violable laws of nature, eg Gravity/Inertia. Base entire (empirical) theories on these invariants.
- ② Basic idea: a mathematical law cannot be discovered from empirical data unless something is repeated systematically.
- ③ Karl Popper: you're not doing science unless you can falsify: Falsifiable models have no free parameters to tweak that would make a wrong model fit adequate data.
- ④ Basis for modern econ. theory:
 - ① The optimization principle. People try to choose the best patterns of consumption they can afford, and/or
 - ② The equilibrium principle: prices adjust until the amount that people demand of something is equal to the amount that is supplied.
- ⑤ **Falsifiable** finance models: empirically based.
- ⑥ **falsifiable** classes of market dynamics models deduced directly from empirical data. Apply to Money, income, wealth, and the stock market, etc.

STOP!

Write down 2 things you remember from today.

Next time

- ① Probability and Uncertainty
- ② Macro descriptions of markets.