

# **Different Aspects of Liquidity in the Stock Exchange of Thailand: Implications for Trading Strategy and Market Fragility**

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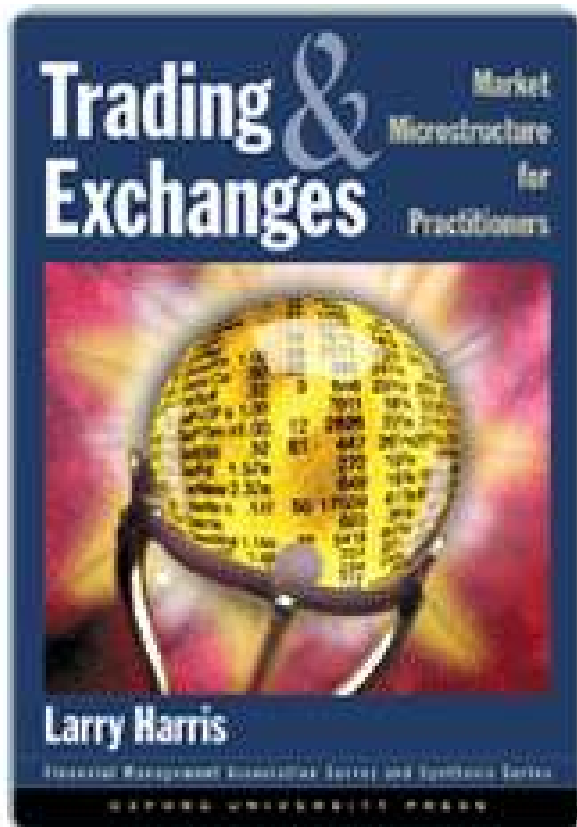
Stock Exchange of Thailand  
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# Readings

## Trading and Exchanges: Market Microstructure for Practitioners

By Larry Harris



## Academic Articles

- “Liquidity Distribution in the Limit Order Book on the Stock Exchange of Thailand,” 2008, *The International Review of Financial Analysis* 17, 291-311.
- “Commonality in Liquidity: Evidence from Stock Exchange of Thailand,” 2009, *Pacific Basin Finance Journal* 17, 80-99.

# Liquidity

- Liquidity is the ability to trade when you want to trade
- Interactions between buy-side and sell-side traders determine the price of liquidity
- Buy-side traders: buy exchange services
- Sell-side traders: sell liquidity to the buy side



# Traders

## Buy-side Traders

- Investors (individuals, mutual funds, endowment funds)
- Borrowers (homeowners, corporations)
- Hedgers (manufacturers, miners, financial institutions)
- Asset Exchangers (travelers, manufacturers)
- Gamblers (individuals)

## Sell-side Traders

- Dealers (market makers, specialists, floor traders)
- Brokers (retail brokers, discount brokers, full-service brokers, institutional brokers)

# Trade Facilitators

- Exchanges
- Clearing and Settlements
- Depositories
- Custodians



# Orders

- Order is a trade instruction
- Understanding orders will help us to see where liquidity comes from
- Some orders offer liquidity by presenting other traders with trading opportunity (i.e. Limit order)
- Some orders take liquidity by seizing those opportunities (i.e. Market order)



# Order Example

- Limit Order: John wants to buy 1,000 shares of Bangkok Bank (BBL) at no more than 120 Baht/share
- Market Order: John wants to buy 1,000 shares of Bangkok Bank (BBL)
- Individuals and small traders do not afford to monitor the market all the time, they use orders to represent their interests and intentions.
- Carefully written orders will adequately represent traders' interest even when some conditions change

# Trading Sessions

## Call Market

- All traders trade at the same time when the market called
- The market may call all securities simultaneously or in a rotation

## Continuous Market

- Traders may trade any time while the market is open



# Order-Driven Market

- Order driven market uses trading rule to arrange their trades
- It uses order precedence rules to match buyers and sellers (price priority and time precedence)
- Order precedence rules are important for a construction of a consolidated limit order book
- SET is a pure order-driven market with no dealers or market makers



# Limit Order Book

- A limit order book contains the orders remaining after netting for execution and cancellation
- It indicates the availability of liquidity for an instantaneous trade.
- Many exchanges around the world operate on a pure limit order driven system.
- In this system, there is no dealer or market maker, and liquidity is totally supplied by the public trader.
- For the NYSE and NASDAQ, liquidity is provided through a public limit order book and market maker.

# Hypothetical Limit Order Book

Ask Size (shares)	Price (Baht)	Bid Size (shares)
4,000	125	
3,200	123	
2,500	122	
	121	1,500
	120	2,000
	119	1,900

# Limit Order Book Transparency

- Since June 2003, the NYSE has disclosed the real-time specialist's order book and all liquidity quote information through a membership subscription
- Several researchers predicted that the transparency of a specialist's order book could result in
  - a reduction in the specialist's participation and profits
  - a reduction in the bid–ask spreads
  - an increase in trading volume
  - a reduction in price volatility

# Limit Order Book Transparency

- These researchers thought liquidity information beyond the best quote would affect the price discovery process and the behavior of traders
- There are few microstructure studies that document the nature of liquidity beyond the best quote



# Informed Trading

- Informed traders are speculators who acquire and act on information about fundamental values
  - Value traders
  - News traders
  - Informational oriented technical traders
  - Arbitrageurs
- Informed traders make prices informative
- Liquidity providers need to understand informed trading to understand the risks when they offer liquidity

# Informed Trading and Liquidity Providers

- Liquidity providers lose to well-informed traders
- The profitability of liquidity providers depends on how well they can cope with well-informed traders
- Liquidity providers are passive traders who trade when other traders want to trade
- Passive traders do not control timing of the trade
- Passive traders need to be careful about how and whom they offer to trade



# Who are Liquidity Providers?

- Liquidity providers are profit-motivated traders
- They sell ‘immediacy’ to impatient traders
- They sell securities to impatient buyers at high prices
- They buy securities from impatient sellers at low prices
- The difference in price (price spread or bid-ask spread) compensate them for providing liquidity





# Bid-Ask Spread

- The bid ask spread is the price impatient traders pay for immediacy
- The spread is a compensation to liquidity providers for offering liquidity
- It is the most important factor that traders consider when they decide whether to be a liquidity takers (submit market order) or a liquidity providers (submit limit order)



# Adverse Selection Cost

- Adverse selection (asymmetric information) cost compensates liquidity providers for the losses they suffer when trading with well-informed traders
- Bid-ask spread widens when the presence of informed traders is most likely
  - Opening period
  - Surrounding announcement



# Limit Order Book Without Asymmetric Information

- In the absence of asymmetric information, the orders standing on the order book may not necessarily have a uniform distribution
- I.e., the depths and price spreads in the order book are not all equal
- Parlour (1998) showed that because of the crowding-out effect, liquidity providers compete against each other for the liquidity payment
- As a result, even though all traders have the same set of information, the orders do not arrive randomly; instead, they exhibit a specific pattern that reflects a crowding-out effect

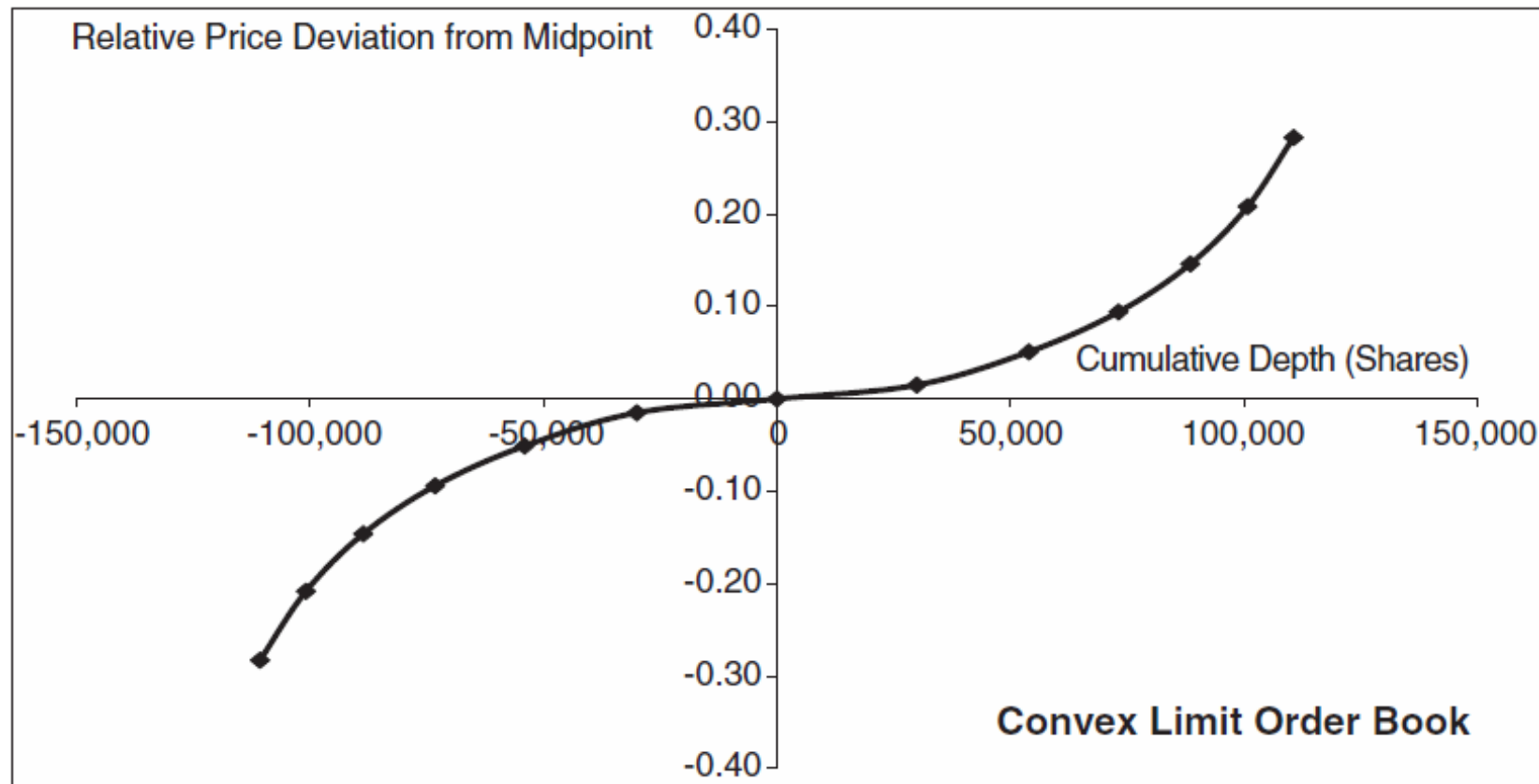
# Limit Order Book With Asymmetric Information

- In the presence of informed traders, limit order traders are concerned about the picked-off risk
- They supply less liquidity at the market, resulting in thinner market depths
- Moreover, a tick size rule could affect the liquidity distribution of an order book
- A small tick size may not be enough to compensate for the cost of liquidity provision in the presence of informed traders
- To receive higher price spreads, limit order traders submit their orders away from the market, resulting in thin liquidity at the market.



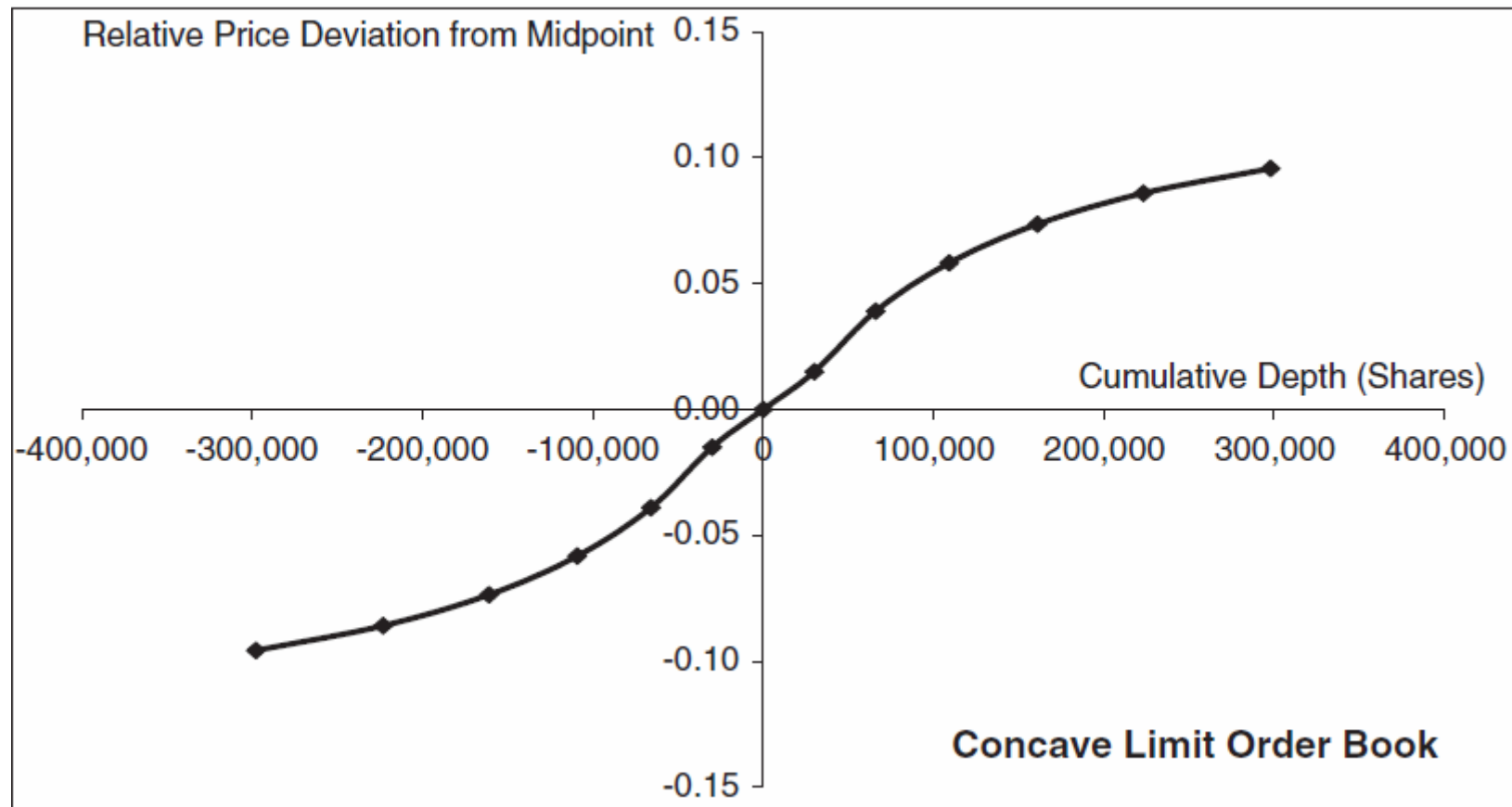
# Hypothetical Shape of Limit Order Book

- Relatively high liquidity at the best quote
- When the relative price spreads increase by 20% and the depths decrease by 20% at each successive quote away from the market



# Hypothetical Shape of Limit Order Book

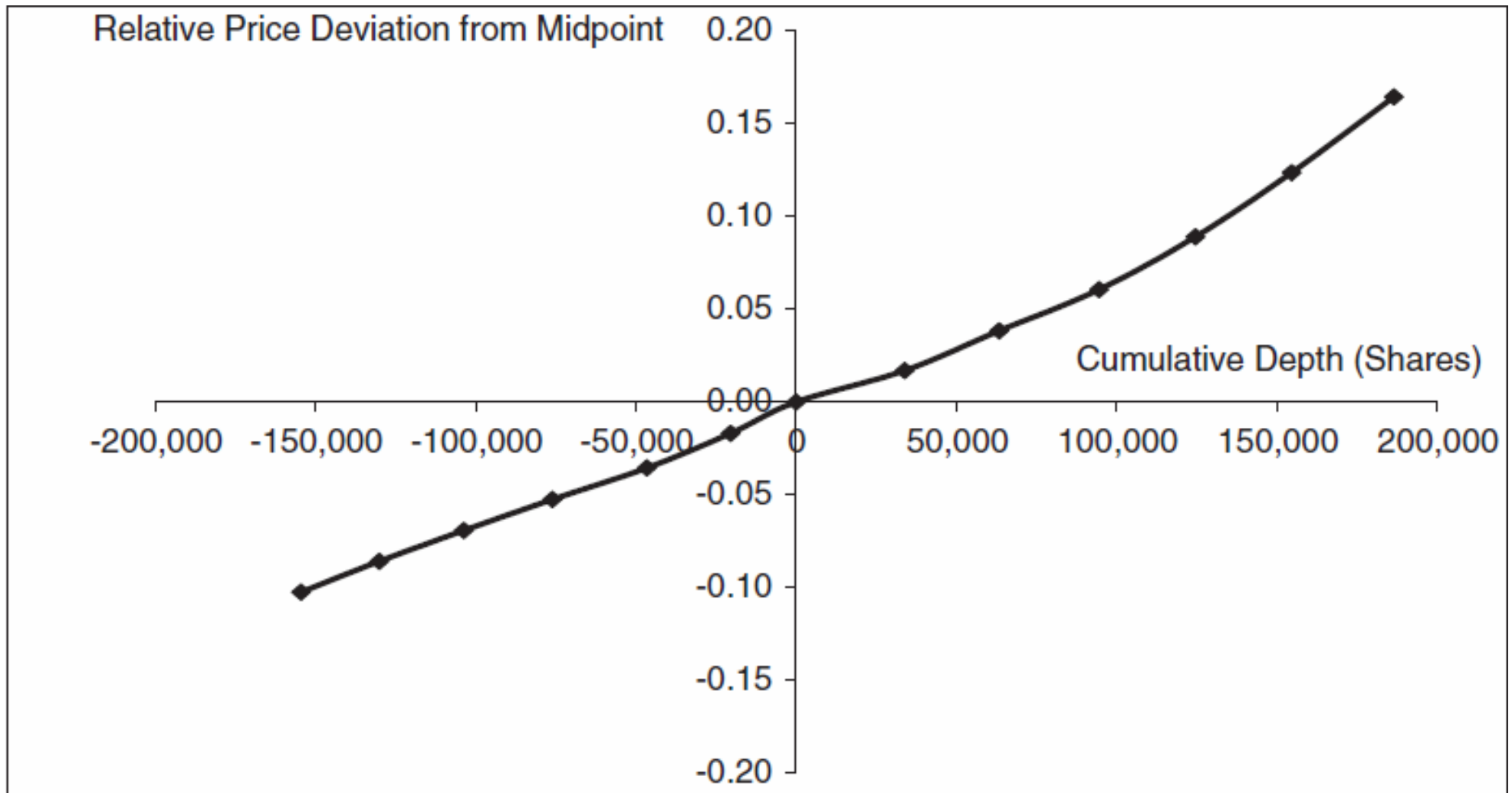
- Relatively low liquidity at the best quote
- When the relative price spreads decrease by 20% and the depths increase by 20% at each successive quote away from the market



# Shape of Limit Order Book: Hypotheses

- Hypothesis 1. Bid–ask spread is wider than other spreads away from the market.
- Hypothesis 2. Depth at the best quote is thinner than depth away from the market.
- Hypothesis 3. Availability of liquidity near the best quote is positively associated with minimum tick size and negatively associated with asymmetric information.

# Cross-Sectional Shape of Limit Order Book on SET

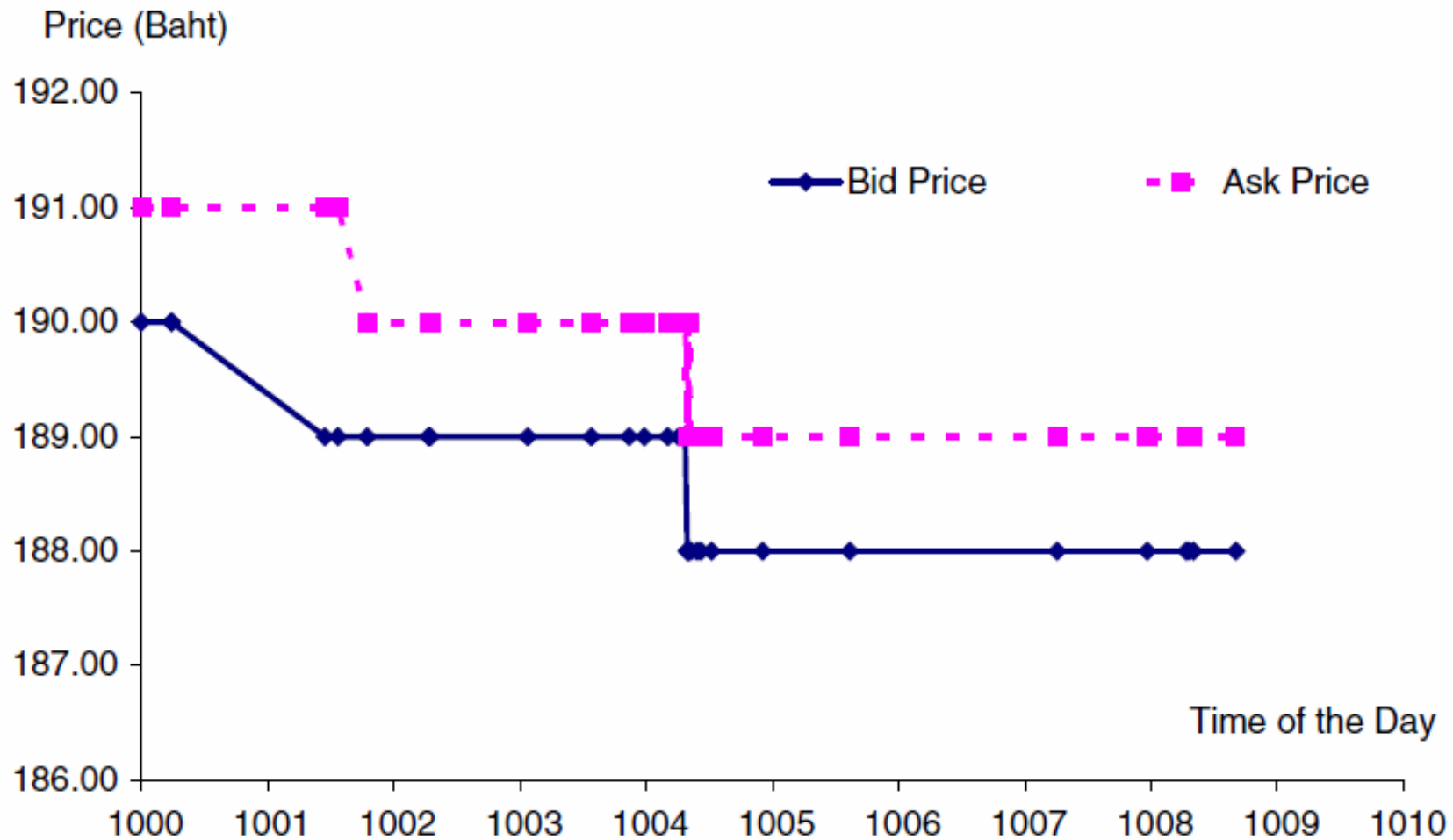




# Construction of Limit Order Book

- A limit order book for a given time period was created by classifying all orders prior to the time in consideration into three categories: buy, sell, and cancelled.
- Shares from the buy and sell orders were assigned to their corresponding prices in the limit order book.
- Then, the number of shares traded prior to the end of the interval was subtracted from the number of shares available on both sides of the book.
- Each trade record in the trade file provides the ID numbers of the buy and sell orders.
- These IDs made it possible to determine the exact orders from which the number of shares traded were being subtracted.

# Dynamic of Bid/Ask Quote



# Spreads at Adjacent Levels in the Limit Order Book

Ask Side	Spread (%)	Bid Side	Spread (%)
• A6-A5	1.66	• B1-B2	2.14
• A5-A4	1.66	• B2-B3	2.22
• A4-A3	1.67	• B3-B4	2.84
• A3-A2	1.70	• B4-B5	3.46
• A2-A1	1.86	• B5-B6	4.07
• A1-B1	3.38		

# Depths at Adjacent Levels in the Limit Order Book

Ask	Depth (shares)	Bid	Depth (shares)
• A6	24,400	• B1	33,880
• A5	26,398	• B2	29,490
• A4	27,608	• B3	31,173
• A3	29,497	• B4	30,081
• A2	26,134	• B5	29,984
• A1	20,414	• B6	31,932

# Determinants of the Shape of Limit Order Book

$$\text{Convexity}_i = \beta_0 + \beta_1 \text{TickSize}_i + \beta_2 \text{FirmSize}_i + \beta_3 \text{Volatility}_i + \beta_4 \text{Volume}_i + \varepsilon_i$$

	Total book	All firms	
	All firms	Bid side	Ask side
Tick size	0.556 (6.56)**	0.466 (6.70)**	0.546 (5.23)**
Firm size	0.205 (3.11)**	0.141 (2.20)*	0.245 (3.59)**
Volatility	-0.693 (-7.45)**	-0.718 (-8.21)**	-0.491 (-4.38)**
Volume	0.032 (0.63)	0.068 (1.08)	-0.024 (-0.45)

# Time Variation of Spread and Depth

	Market depth	Displayed depth	Bid-ask spread
Constant	51,941**	150,578**	1.1294**
10:00–10:30	–13,439**	–43,719**	0.5248**
10:30–11:00	–8728**	–24,559**	0.1763**
11:00–11:30	–6162**	–14,055**	0.0553**
11:30–12:00	–3931**	–6993**	–0.0140
12:00–12:30	–2038**	–1401**	–0.0590**
14:30–15:00	2689**	8920**	–0.1294**
15:00–15:30	5385**	16,396**	–0.1565**
15:30–16:00	8988**	24,530**	–0.1885**
16:00–16:30	17,235**	40,881**	–0.2090**
Monday	–10,987**	–20,068**	0.1006**
Tuesday	–8632**	–10,447**	0.0215*
Wednesday	647	1941**	–0.0370**
Thursday	19,967**	25,201**	–0.0327**
Friday	–995	3373	–0.0524**

# Commonality in Liquidity

- Are individual stocks affected by the common determination of liquidity, due to the absence of the liquidity provider of last resort?
- Yes: HKSE (Brockman and Chung, 2002)
- No: ASX (Fabre and Frino, 2004)
- The announcement of capital control policy on December 18, 2006 resulted in a sharp fall of SET index for 15%.
- CML research will help governmental officials or researchers gain insights of the factors that affect the sensitivity of the liquidity market and implement policies that might prevent turmoil from liquidity shocks.

# Commonality in Liquidity

## Beyond the Best Quote

- Nature of liquidity beyond best bids and offers in the limit order book is important for less liquid assets because the orders will frequently walk up the book.
- Best quotes are noisy and may not be well-suited for a commonality study because they are affected by idiosyncratic risk because the suppliers of liquidity compete intensely for new price priority.



# Definition of Liquidity Variables

Spread	SPR	$P_{A,1} - P_{B,1}$
Proportional spread	PSPR	$(P_{A,1} - P_{B,1}) / [(P_{A,1} + P_{B,1}) / 2]$
Depth	DEP	$D_{A,1} + D_{B,1}$
Displayed depth	DDEP	$\sum_{i=1}^3 (D_{A,i} + D_{B,i})$
Average spread	ASPR	$\bar{P}_A - \bar{P}_B$
Proportional average spread	PASPR	$(\bar{P}_A - \bar{P}_B) / [(\bar{P}_A + \bar{P}_B) / 2]$

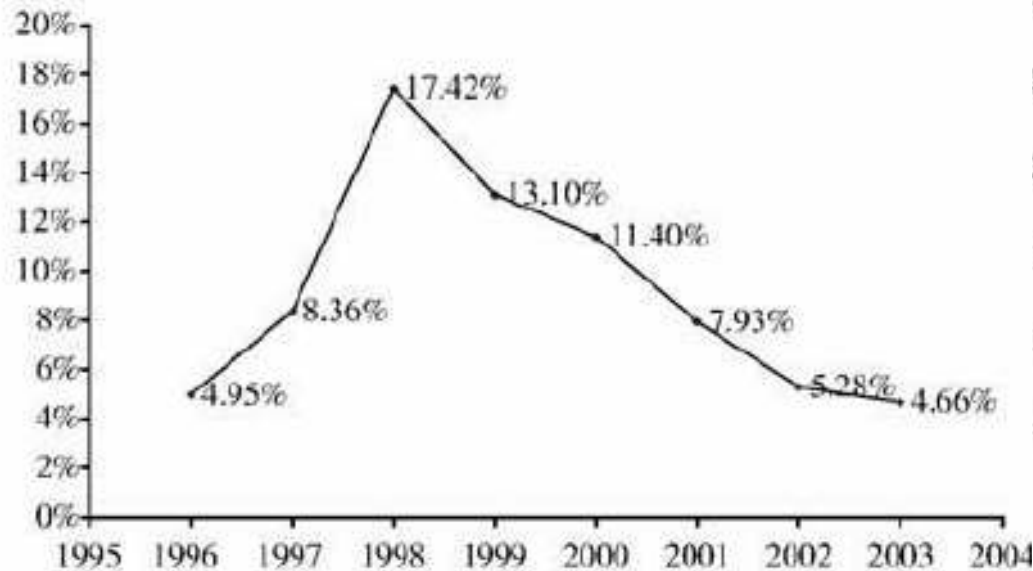
# Descriptive Statistics of Liquidity Measures

	Mean	Median
SPR	2.36	1.22
PSPR	8.12%	7.23%
ASPR	3.58	1.95
PASPR	12.34%	11.50%
DEP	94,855	20,426
DDEP	369,020	70,701
RATIO	35.22%	34.82%

# Time-Series of Liquidity Measures

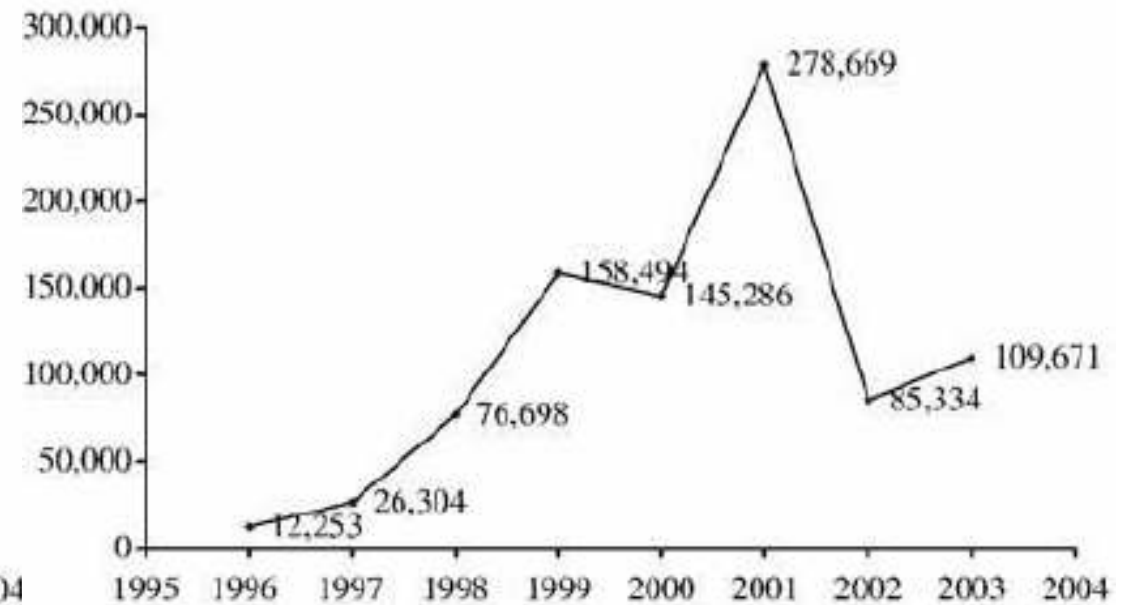
## Proportional Spread (%)

Proportional Spread (%)



## Depth (shares)

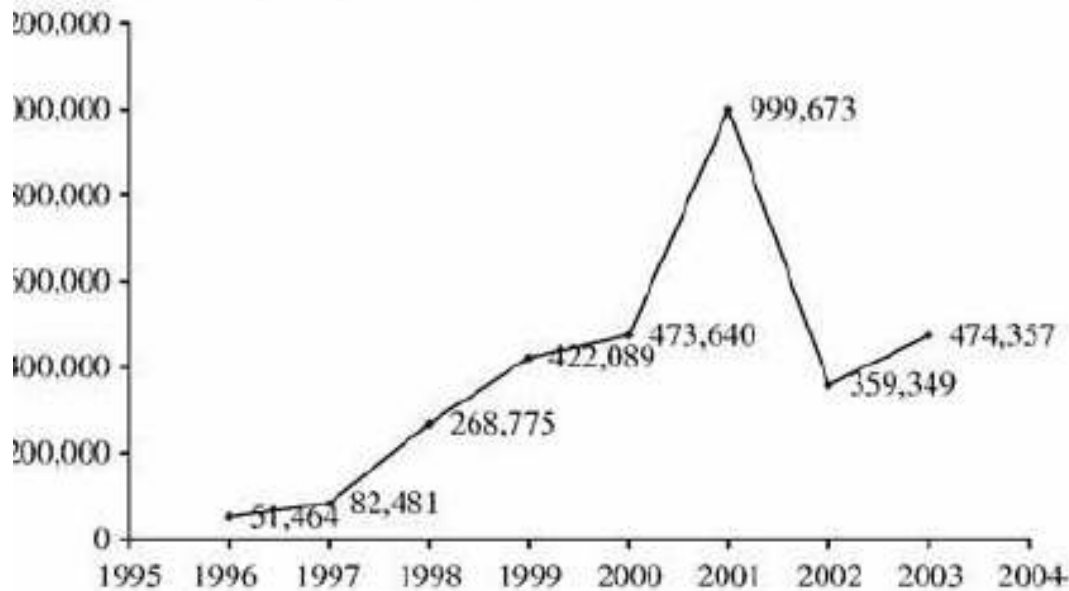
Depth (Shares)



# Time-Series of Liquidity Measures

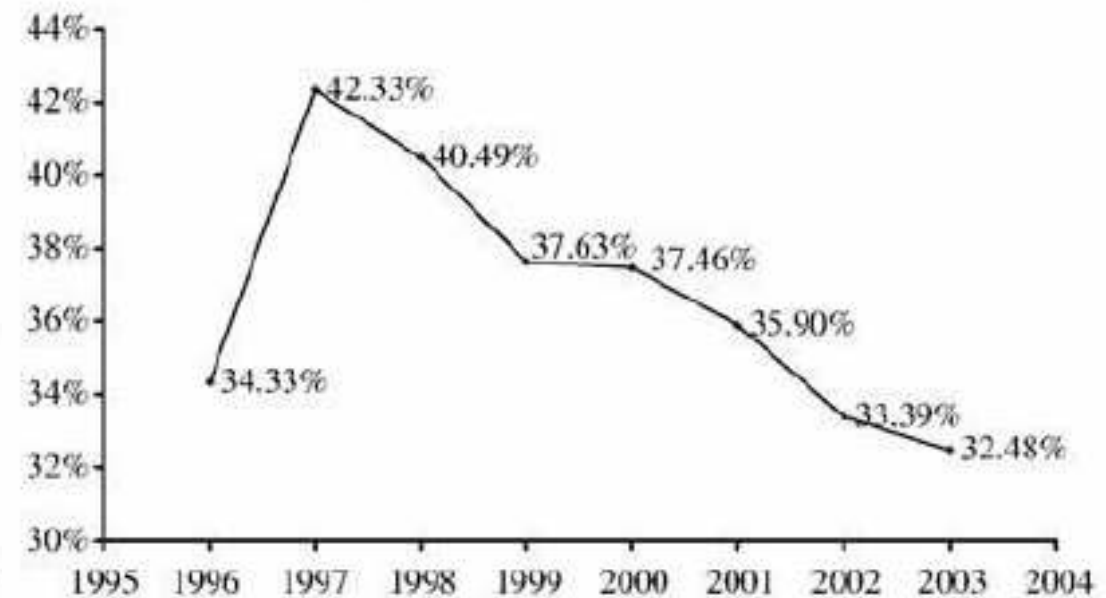
## Displayed Depth (shares)

Displayed Depth (Shares)



## Ratio of Outside Depth (%)

Ratio of Outside Depth (%)



# Cross-Sectional Correlations

	SPR	PSPR	ASPR	PASPR	DEP	DDEP
PSPR	0.21					
ASPR	0.98	0.13				
PASPR	0.17	0.98	0.10			
DEP	-0.18	-0.35	-0.16	-0.31		
DDEP	-0.18	-0.37	-0.15	-0.33	0.98	
RATIO	0.33	0.88	0.23	0.82	-0.42	-0.43



# Evidence of Common Liquidity

$$DL_{i,t} = \alpha + \beta_1 DL_{M,t} + \beta_2 DL_{M,t-1} + \beta_3 DL_{M,t+1} + \varepsilon_{i,t}$$

Concurrent

	Mean	<i>t</i> -stats	% (+)	% (+) s
SPR	0.450	38.86	99	25
PSPR	0.841	48.23	100	72
ASPR	0.326	31.62	97	17
PASPR	0.732	36.53	99	59
DDEP	0.311	19.38	88	35
DEP	0.414	26.07	97	46
RATIO	0.858	31.62	97	66

# Industry and Market-wide Commonality in Liquidity

$$DL_{i,t} = \alpha + \beta_1 DL_{M,t} + \beta_2 DL_{M,t-1} + \beta_3 DL_{M,t+1} + \lambda_1 DL_{Ind,t} + \lambda_2 DL_{Ind,t-1} + \lambda_3 DL_{Ind,t+1} + \varepsilon_{i,t}$$

		Concurrent			
		Mean	t-stats	%(+)	%(+)'s
SPR	M	0.345	18.89	89	5
	I	0.177	10.08	73	11
PSPR	M	0.139	4.22	59	8
	I	0.712	24.37	92	38
ASPR	M	0.265	15.82	85	8
	I	0.199	10.60	75	15
PASPR	M	0.154	5.17	60	12
	I	0.697	25.91	90	51
DDEP	M	0.125	11.25	74	13
	I	0.235	15.03	82	30
DEP	M	0.190	16.75	84	14
	I	0.280	16.93	90	30
RATIO	M	-0.201	-5.39	35	6
	I	1.061	43.63	98	83



# Market Common Liquidity by Size

		Concurrent			
		Mean	<i>t</i> -stats	%(+)	%(+)'s
SPR	L	0.464	24.86	99	34
	M	0.465	20.94	99	27
	S	0.422	22.14	99	14
PSPR	L	0.817	27.34	100	72
	M	0.852	29.47	100	75
	S	0.853	26.84	99	68
ASPR	L	0.368	20.69	97	25
	M	0.346	18.30	98	14
	S	0.266	16.87	96	11
PASPR	L	0.691	19.11	99	59
	M	0.772	23.34	99	67
	S	0.731	21.09	99	52
DDEP	L	0.436	13.66	91	54
	M	0.295	11.19	87	38
	S	0.205	9.83	85	14
DEP	L	0.540	17.59	98	62
	M	0.395	14.24	96	45
	S	0.308	15.84	97	33
RATIO	L	0.812	17.13	99	66
	M	0.865	20.55	98	69
	S	0.898	17.58	94	64





# Conclusions

- Bid–ask spread is larger than other spreads away from the market.
- Depths away from the market are not statistically different from the others.
- Shape of the SET order book is determined by minimum tick size and information asymmetry
- Common determinations in liquidity imply that liquidity shocks are systematically transmitted across investors or securities, causing broad market effects.

# Other Research Issues

- Liquidity and institutional quality
- Information asymmetry of underlying assets and warrants
- Liquidity and market efficiency
- Commodity liquidity
- Commonality of liquidity in commodity

