Electronic Communications Networks and Liquidity on the Nasdaq

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Background / Motivation

- Electronic Communications Networks have been growing exponentially
- Technological change has reduced search costs – leading to disintermediation
- ECN's are fast, cheap, and anonymous

Background / Motivation

- How has the growth of trading over ECNs affected:
  - Competition on the Nasdaq?
    - Trading costs
    - market concentration
  - Liquidity on the Nasdaq ?
    - Spreads
    - Depths

Previous Problems on Nasdaq

- Evidence of Imperfect Competition on Nasdaq
  - Christie and Schultz (JF 1994)
  - Weston (JF 2000)
- New Regulations help ECNs
- How have ECNs affected Competition ?

What are ECNs ?

- Electronic trading systems that use automated software to match buyers and sellers
  - Either internally or
  - Routed to Nasdaq

- ***Currently*** regulated as brokers

What makes ECNs different?

- Unlike Traditional Nasdaq dealers, ECNs are AGENTS
- ECNs commit no capital
- ECNs charge an agent's fee (Nasdaq dealers cannot charge such a fee)
- Face no inventory / information costs

What drives the growth of ECNs ?

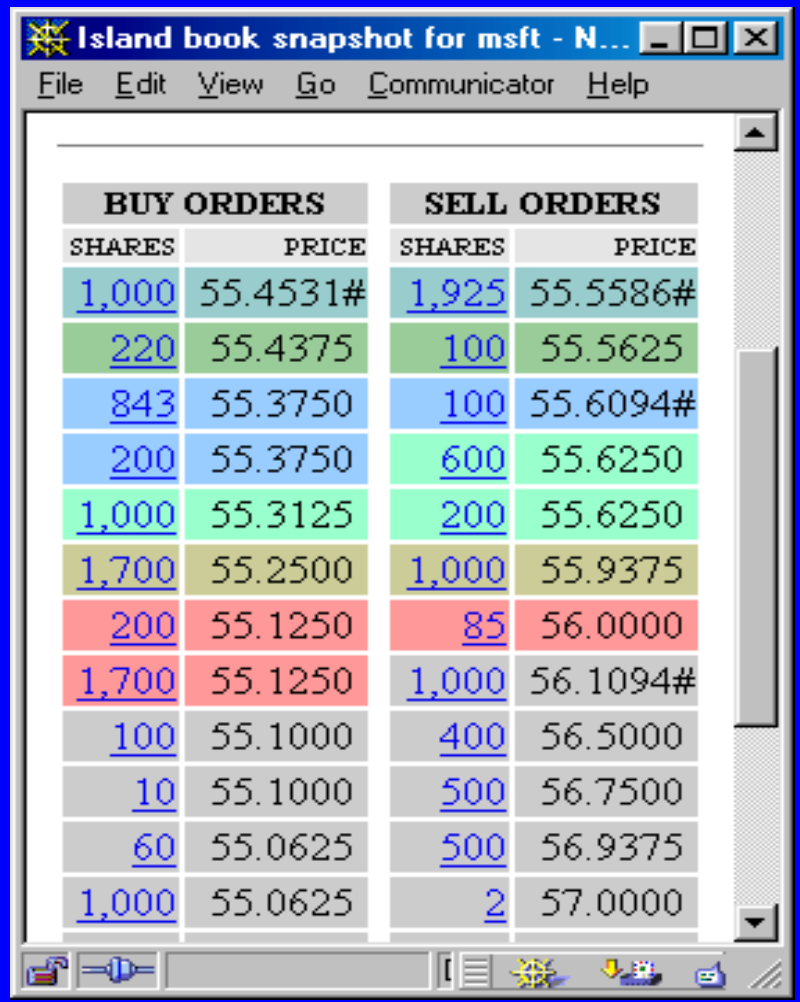
- Investors trade Directly
- Electronic limit order book
- Fast execution
- Anonymity

ECNs are anonymous

- Nasdaq dealers may know the identity of the counter-party
- ECN trading is completely anonymous
- Great benefit to institutional investors

ECNs increase transparency

- Display orders off of the inside quotes
- Allows investors to access limit order book
- However – not a C.L.O.B.



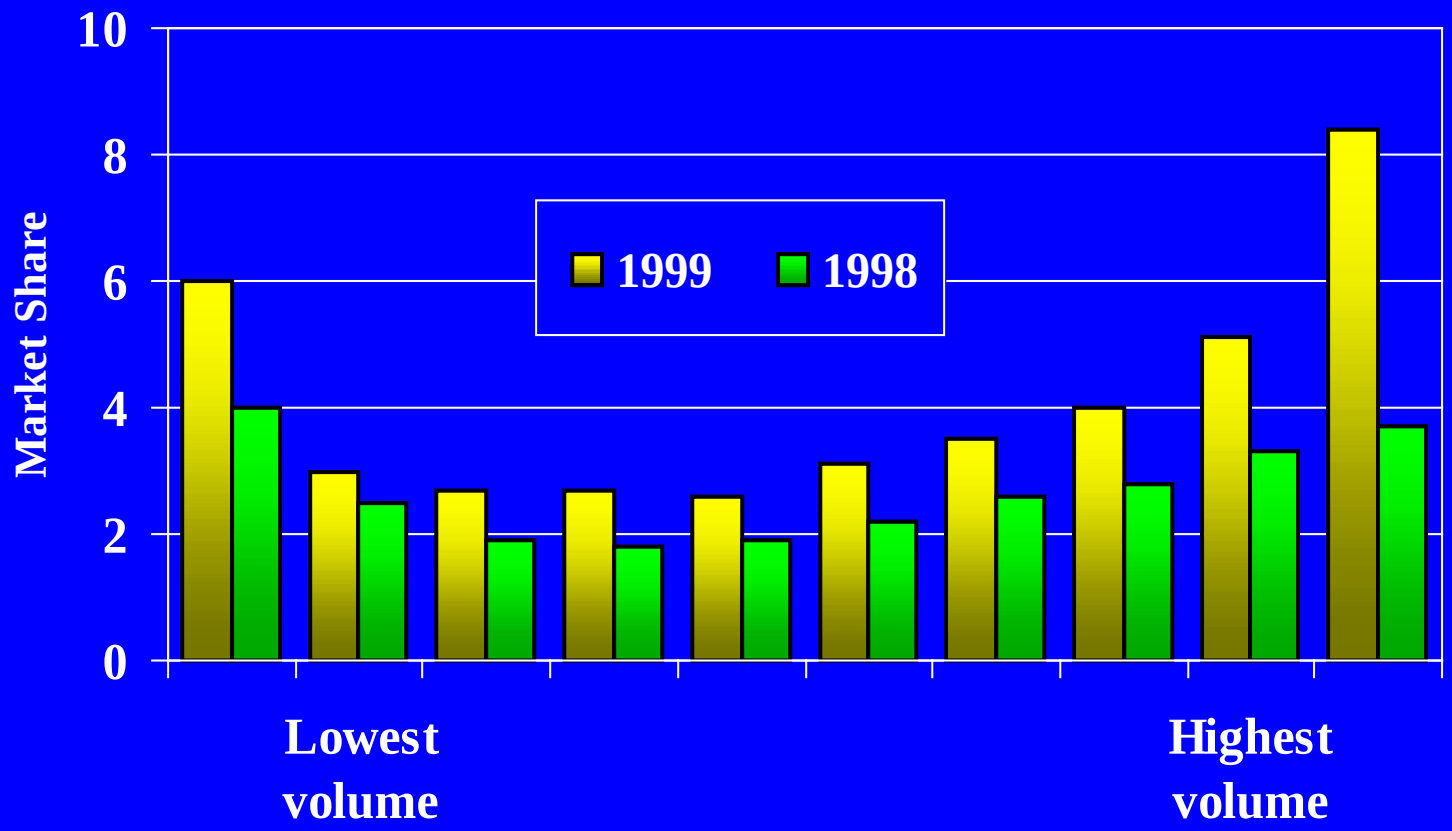
Major Players

- Instinet (Reuters)
  - High level of liquidity
  - Oldest and largest
  - Focus on Institutional Traders
- Island (Datek)
  - Technically sophisticated (open limit order book)
  - Retail and Day-traders
- Others
  - Archipelago, RediBook, Bloomberg Trade book

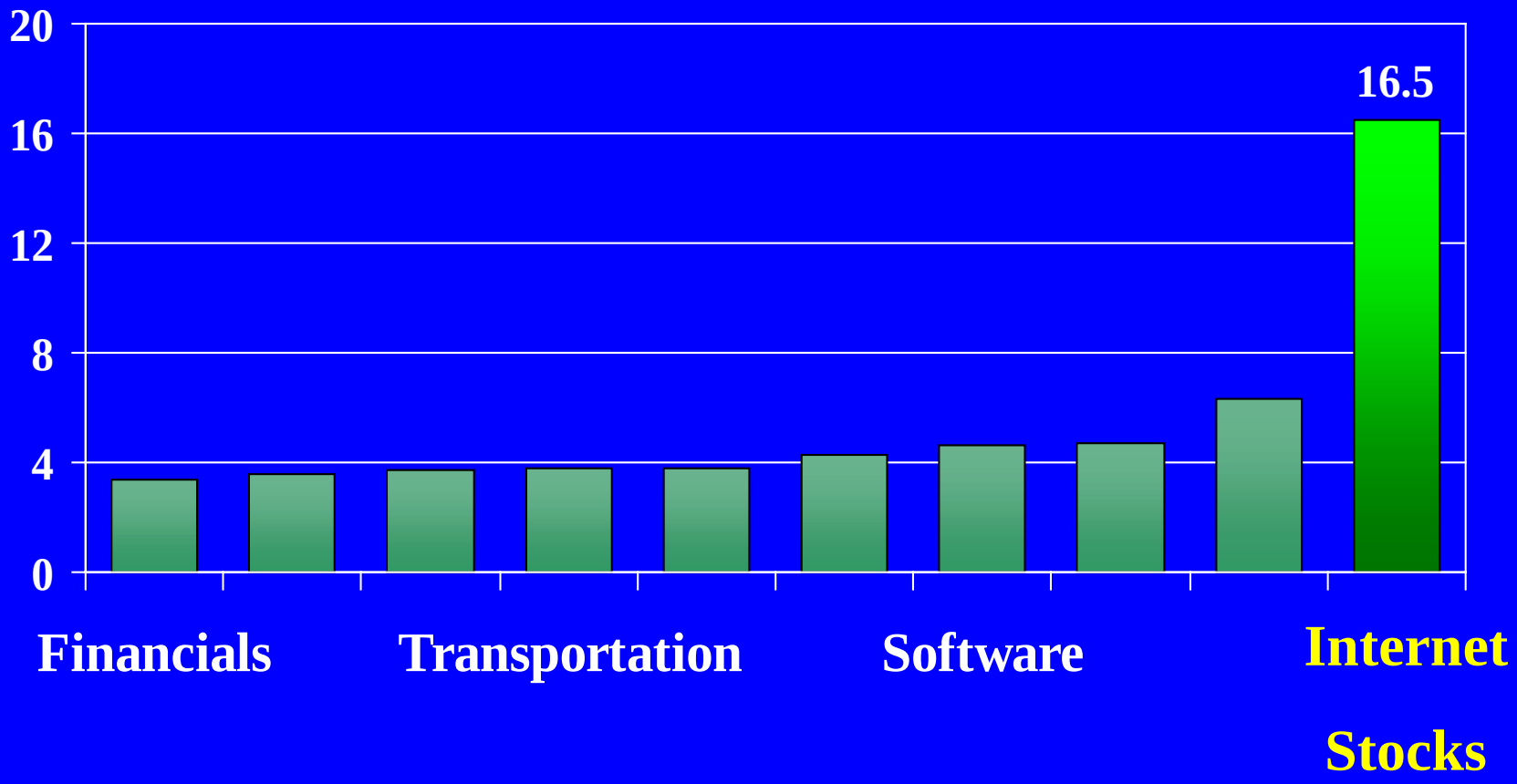
Market Share by ECN

	Share of Nasdaq Volume (%)	
ECN	**1998**	**1999**
Instinet	2.5	3.0
Island	0.8	4.9
Redi-Book	0.1	0.7
Bloomberg	0.4	0.6
All Others	0.1	0.5
Total	3.8	9.7

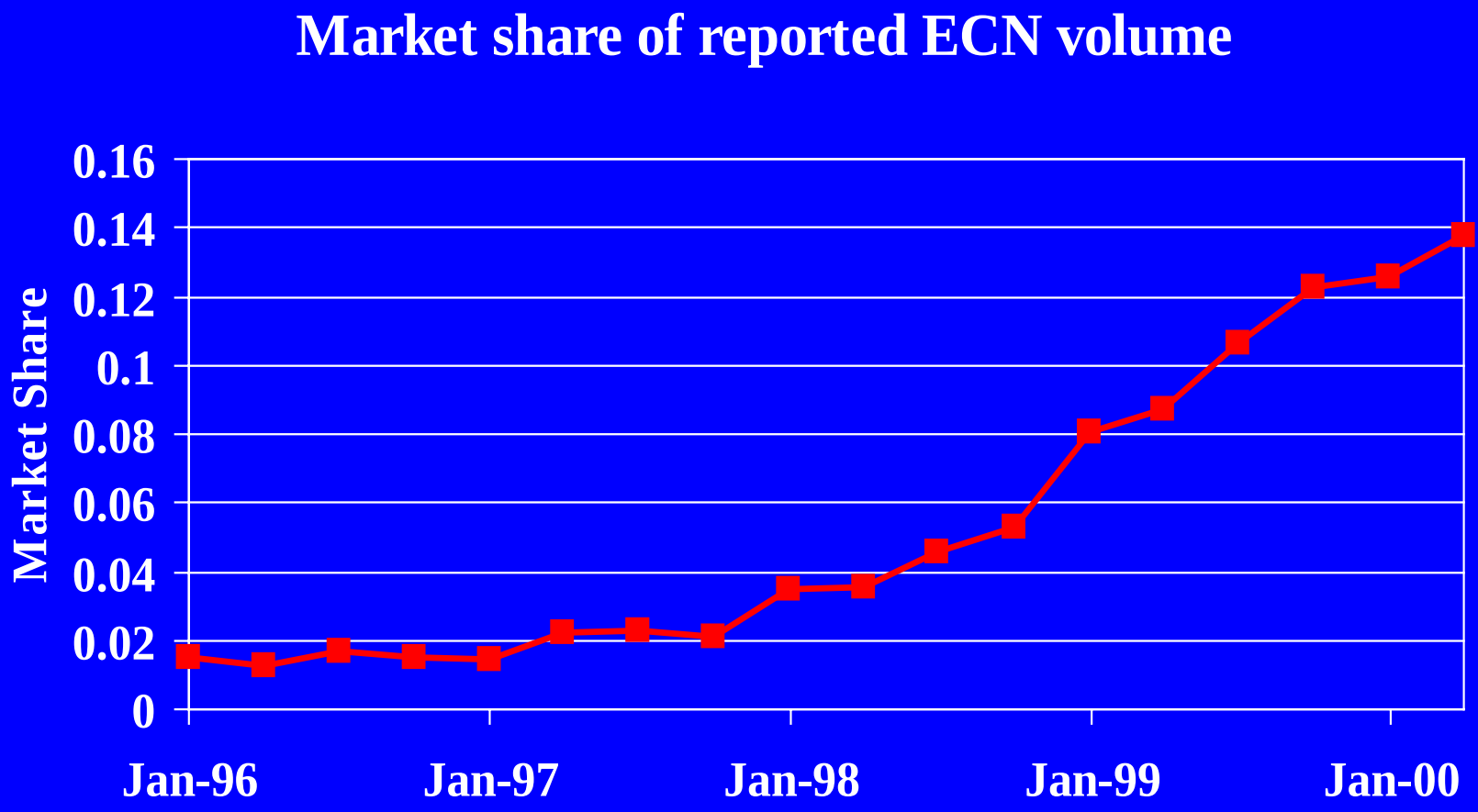
ECN Market Share by Volume Decile



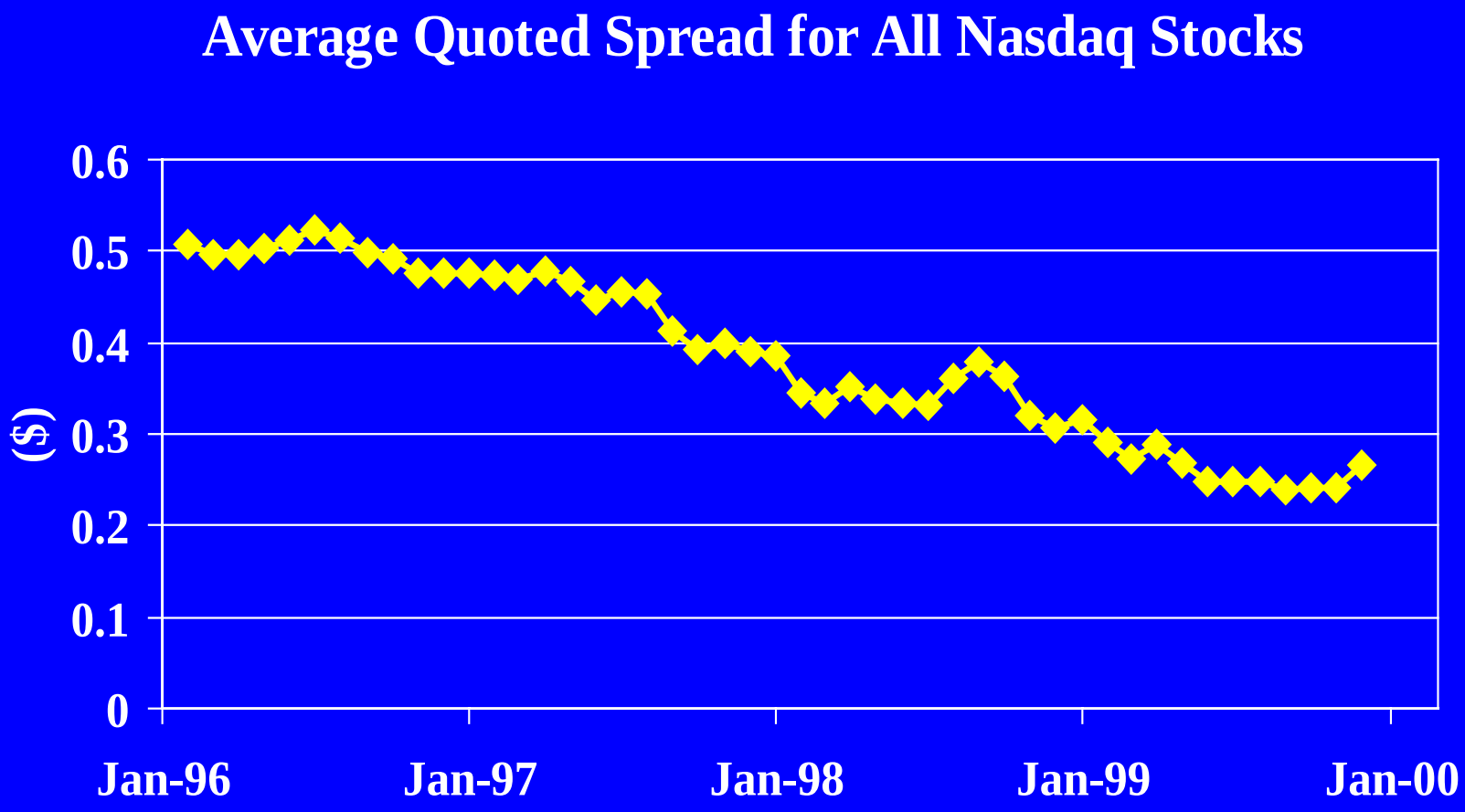
Market Share : By Industry (1999)



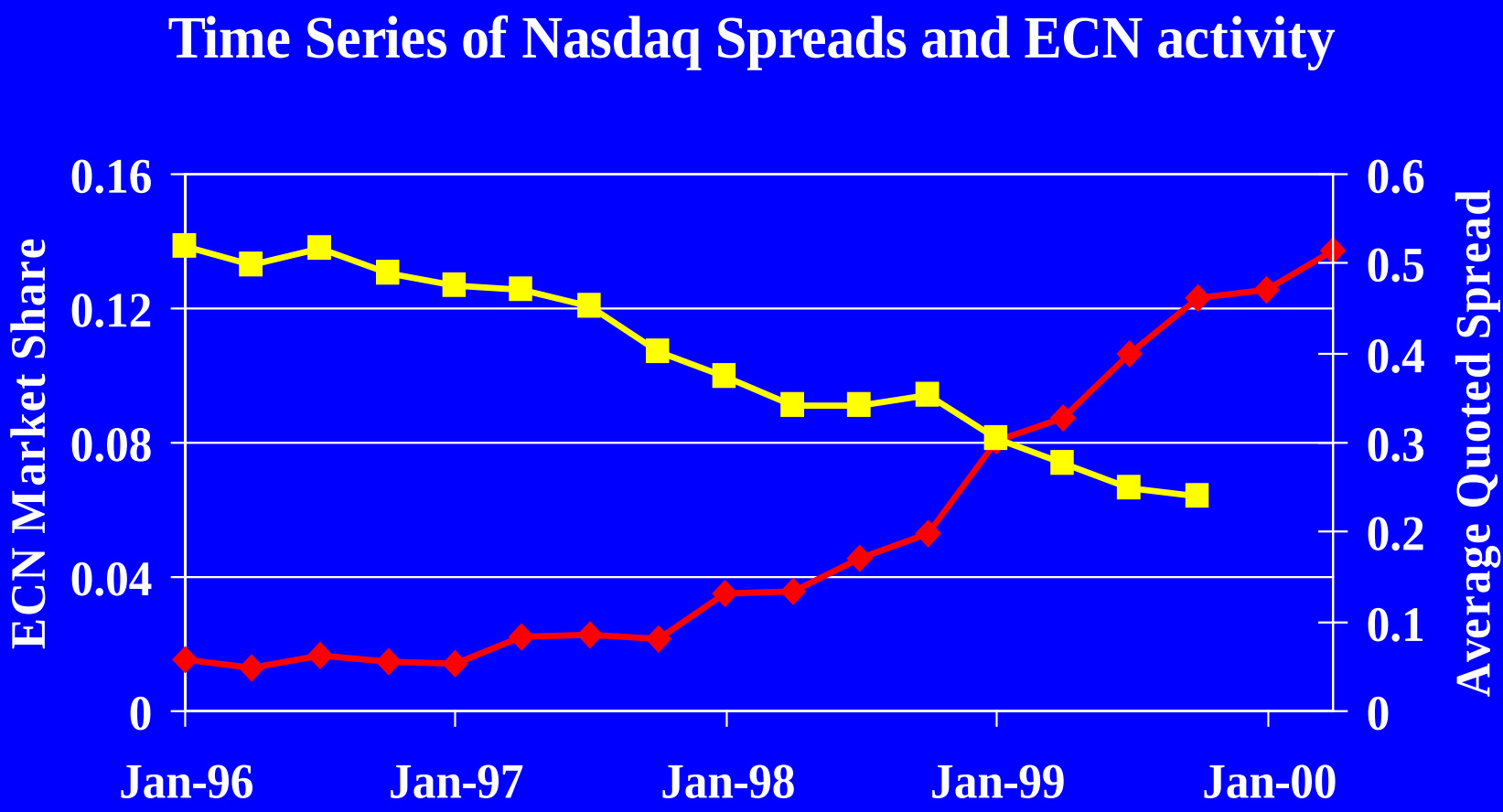
The Growth of ECNs



The Decline in Nasdaq Spreads



Is There a Relationship ?



Previous Research on ECNs

- Hendershott and Mendelson (forthcoming JF)
  - Positive liquidity effect of ECNs
  - Negative crowding effect
- Simaan, Weaver and Whitcomb (WP 1998)
  - ECN's are more likely to post odd-teen quotes
- Huang (WP 2000)
  - ECNs contribute to price discovery

Contributions of this Paper

- Few academic studies on ECNs
- Are ECNs competing with Nasdaq dealers ?
- Do ECNs improve the liquidity of the Nasdaq?

Data / Sample

- All Nasdaq firms
- Monthly market maker volume obtained from Nasdaq
- Firm Characteristics from CRSP

Research Design

- Does the level of ECN activity affect liquidity for Nasdaq stocks?
- Control for other factors that might have an effect on liquidity
- Two methods:
  - Linear Regression
  - Matched Sampling

Effect of ECNs on Liquidity (Linear Regression)

$$Liquidity_{i,t} = \alpha + \beta_1 \ln(ECNshare)_{i,t} + \beta\, Controls_{i,t} + \varepsilon_{i,t}$$

H_o: $\beta_1 = 0$ (ECNs have no affect on Liquidity)

H_1: $\beta_1 > 0$ (ECNs increase Liquidity)

Effect of ECNs on Liquidity

Liquidity is measured as:

- Spread
- Depth
- Market Concentration (HHI)

Control variables are: Price, Volume, Volatility, and HHI

Effect of ECNs on Liquidity (What do we expect for β ?)

	Quoted Spread	Relative Spread	Depth	HHI
ECN share	**?/-**	**?/-**	**?/+**	**?/-**
Price	**-**	**?**	**+**	**?**
Volume	**-**	**-**	**+**	**-**
Volatility	**+**	**+**	**-**	**?**
HHI	**+**	**+**	**-**	**NA**

Effect of ECNs on Liquidity
Estimates of β

	Quoted Spread	Relative Spread	Depth	HHI
ECN share	**-1.6%**	**-1.6%**	**5.1%**	**-4.1%**
T-statistic	**-5.33**	**-5.33**	**12.75**	**-10.25**
R^2	**0.91**	**0.88**	**0.58**	**0.26**

Effect of ECNs on Liquidity

- Based on the linear regression, we find that an increase in ECN activity:
  - Decreases spreads
  - Increases Depth
  - Decreases Market Concentration

Second Methodology
Matched Sample

- Nonlinearities / Endogeneity problems in the regression.
- Use a method that does not rely on regression
- **Match** firms based on **Price, Volume, Volatility**.

Second Methodology
Matched Sample

- Take each pair of firms:
  - Assign each firm to **High** or **Low** ECN-share portfolio.
- Test Differences in **Portfolios**.
- We expect that firms in the **High** ECN-share portfolio have: lower spreads, greater depths and are less concentrated.

Portfolio Percentage Differences ($HIGH_{ECN\ share} - LOW_{ECN\ share}$)

	ECN Share	Spreads	Depth	HHI
All Pairs	103%	-2.6%	3.6%	-15.3%
Small Diff.	35.3%	-1.1%	1.9%	-7.8%
Large Diff.	171%	-3.8%	5.9%	-22.5%

Conclusions

- ECN's Market share has grown exponentially over the past 4 years
- ECN's lower spreads, increased depth and decrease market concentration.
- Overall, ECNs improve liquidity on the Nasdaq.

Caveats

- What happens to ECN liquidity during a market crisis.
- Are ECNs unfairly benefiting from an SEC loophole?
- Will ECNs get **CLOB**bered

Extensions / Future Work

- Distinguish effects by type of ECN
- Market Maker Entry / Exit
- Anonymity