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## ***Understanding Hidden Liquidity within the Spread***

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### **Overview**

Leading Electronic Communications Networks (ECNs) have entered the hidden liquidity foray by offering the hidden order type. Traders have the ability to send non-display orders anywhere in the order book, especially within the spread, without affecting the quote. This new trading technique of utilizing hidden orders on the ECNs has increased the liquidity available between the spread. This liquidity, which could increase fill rates and provide price improvement, is especially valuable for thin stocks with wide spreads and can lead to tremendous long-term transaction cost savings.

ITG has conducted an in-depth analysis to determine the existence and distribution of such liquidity in major ECNs in order to develop logic that exploits hidden liquidity between the spread.

The study validates that a significant amount of hidden liquidity exists within the spread of ECN order books, especially for thinly traded stocks with wide spreads. Hidden liquidity trades that occur between the best bid and best offer make up approximately 20-40% of the traded volume for stocks with a spread greater than 1 cent. The value of hidden liquidity resonates greatly for illiquid stocks where information leakage and market impact are of utmost concern.



Unlike algorithms which react solely to displayed liquidity and lack the ability to send hidden orders, the ITG Dark Algorithm<sup>®</sup> utilizes special hidden order logic derived from in-depth and continuous liquidity research. The logic allows the algorithm to intelligently place hidden orders between the spread and play within the spread without information leakage and quote impact, in order to reap the benefits of price improvement and higher fill rates.

## **Methodology**

For this study, hidden liquidity is defined as non-display orders placed strictly between the best bid and best offer for stocks with a spread greater than 1 cent. The hidden trades were identified through analysis of historical tick data and counting the trades occurring between the national best bid and best offer (NBBO) on particular ECNs, specifically Nasdaq and NYSE Arca. Hidden volume is defined as the volume from these hidden trades. The study was further refined to examine the hidden liquidity in the spread between listed stocks and OTC stocks on these ECNs.

## **Findings**

- For OTC stocks traded on Nasdaq, the analysis shows between 11-48% hidden volume, with the average around 19%. Greater hidden liquidity exists for listed stocks traded on Nasdaq, with the percent of hidden volume ranging from 40-50%.
- The amount of hidden liquidity tends to increase as the spread increases. Under most circumstances, this holds true for both the percent of hidden trades as well as percent of hidden volume.
- Listed stocks appear to have more hidden liquidity than OTC stocks, independent of trading venue. For the percentage of volume that is hidden, listed stocks are 10-20% higher than OTC stocks.
- The tables below categorize the amount of hidden liquidity into four groups: OTC stocks traded on Nasdaq, OTC stocks traded on ARCA, listed stocks traded on Nasdaq, and listed stocks traded on ARCA.



**OTC Stocks traded on Nasdaq**

Spread (in cents)	Pct of total trades	Pct of trades that are hidden	Pct of total volume	Pct of traded volume that is hidden
2	13.55%	18.39%	8.32%	17.19%
4	1.95%	20.47%	1.22%	20.94%
6	0.73%	27.26%	0.52%	37.31%
10	0.23%	33.80%	0.19%	48.12%

**OTC Stocks traded on NYSE Arca**

Spread (in cents)	Pct of total trades	Pct of trades that are hidden	Pct of total volume	Pct of traded volume that is hidden
2	14.29%	16.79%	9.03%	17.15%
4	2.07%	17.39%	1.30%	14.97%
6	0.76%	17.72%	0.47%	15.65%
10	0.23%	19.54%	0.17%	17.99%

**Listed Stocks traded on Nasdaq**

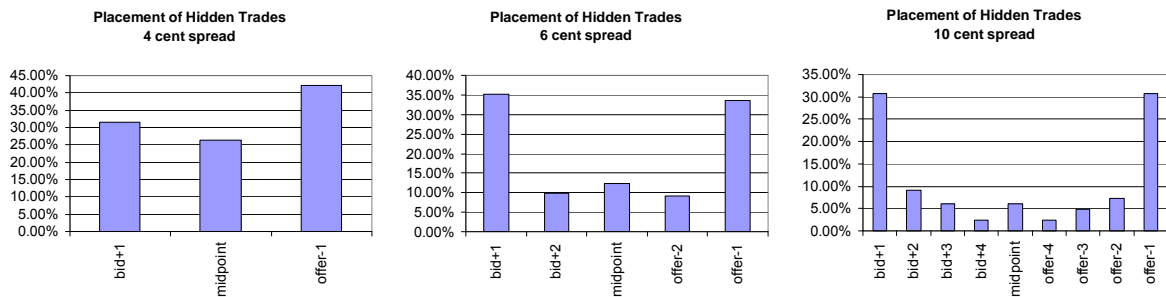
Spread (in cents)	Pct of total trades	Pct of trades that are hidden	Pct of total volume	Pct of traded volume that is hidden
2	11.28%	41.38%	9.09%	41.01%
4	2.02%	37.53%	1.43%	36.49%
6	0.80%	43.31%	0.55%	41.42%
10	0.11%	51.15%	0.09%	40.50%

**Listed Stocks traded on NYSE Arca**

Spread (in cents)	Pct of total trades	Pct of trades that are hidden	Pct of total volume	Pct of traded volume that is hidden
2	9.80%	28.36%	8.45%	25.16%
4	1.87%	27.93%	1.49%	24.73%
6	0.85%	30.96%	0.70%	35.73%
10	0.14%	39.09%	0.19%	33.44%

\*\* Data sampled from Russell 3000 from the month of May 2007

- Most of the hidden volume exists near the bid and ask. The distributions of the hidden trades relative to the best bid and best ask show that the hidden volume decreases as the price gets closer to the midpoint. This relationship holds at all spread levels.



- The percentage of hidden trades has strong correlation with certain stock specific features, such as market cap, average daily volume (ADV), average spread and whether OTC or listed. A regression analysis showed that the coefficients on these factors were all statistically significant. Positive factors included whether the stock was listed and average spread size. Negative factors included market capitalization and ADV. By running a regression of this form, it provided an estimate of the amount of hidden volume that might exist for certain stocks before even seeing the actual spread and placing a trade.

$$\{\text{Percentage of hidden trades}\} = \beta_0 + \beta_1\{\text{Listed or OTC}\} + \beta_2\{\text{Market Cap}\} + \beta_3\{\text{ADV}\} + \beta_4\{\text{Average Spread}\} + \varepsilon$$

The final regression coefficients (with t-values in parenthesis) are:

Intercept:  $\beta_0 = 0.035$  (t=2.3)

Listed or not:  $\beta_1 = 0.109$  (t=12.3)

Market Cap:  $\beta_2 = -2.585 \times 10^{-13}$  (t=-2.4)

ADV:  $\beta_3 = -3.7049 \times 10^{-9}$  (t=-2.4)

Average Spread:  $\beta_4 = 2.6762$  (t=13.1)



## **Conclusion**

Significant hidden liquidity exists on the ECNs between the spread, especially for wider spread stocks. Traders should take full advantage of the hidden liquidity that exists in ECNs. For lower liquidity stocks, this extra hidden volume could dramatically improve performance by lowering overall transaction costs and increasing fill rates.

Using this research, ITG has created special hidden order logic that is available in all ITG Algorithms<sup>SM</sup> through the ITG Dark Algorithm<sup>®</sup>. The logic is designed to utilize hidden orders in the ECNs by intelligently sizing and working the orders between the spread while helping to protect the orders using the ITG Anti-Gaming logic. Clients can access hidden liquidity directly through the ITG Dark Algorithm or any other ITG Algorithm.

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