

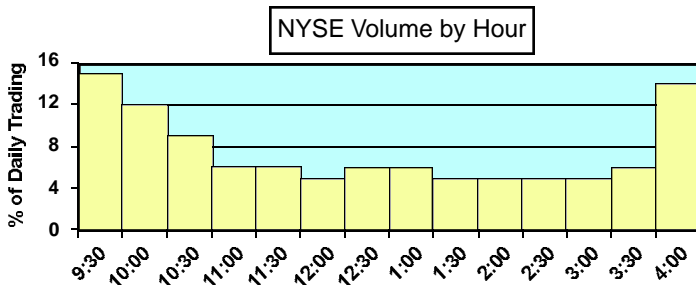
TIME OF DAY EFFECTS ON TRADING COSTS

Traders can trade when other traders are active. In contrast, managers are comfortable trading when news and price action confirm their predisposition. The data shows that managers frequently place orders during the mid-day trading doldrums, while most of the trading volume occurs at the beginning and end of the trading day.

Analysis shows that the market opening is a desirable time to trade. Orders released prior to the open have much lower costs than orders released later. Moreover, the later in the day the order is released, the more costs deteriorate relative to the benchmark.

You Snooze, You Lose

When is the best time for a portfolio manager to release an order? The graph below shows a typical day's trading activity on the NYSE. Traders already know this U-shaped pattern, but managers often express surprise. Over half of the trading occurs before noon; an order released after lunch 12:00 will miss 65% of the day's activity.



Besides missing the early liquidity, additional unpleasant events can occur when orders are released later in the day:

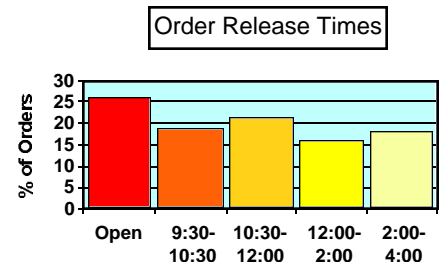
- Prices often move rapidly after the open to encapsulate the over-night information;
- Impact costs are higher during periods when trading is slack;
- Traders always desire to get some portion of an order executed, regardless of release time. This can result in:
 1. Inadvertent signaling to the Street that they will be back the next day seeking more liquidity; and/or
 2. Seeking a safe haven in the ECN's or subtly piecing out small bits. The result is often lower completion rates and increased timing costs.

Costs Increase and Value-Added Deteriorates With Time

Our test sample is representative of common threads in the investment management universe, including:

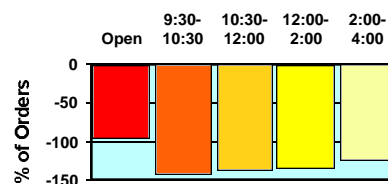
- Active management processes creating the orders;
- Concentration in large capitalization stocks, with 82% of orders in companies over \$10 bil;
- Modest growth orientation, with two-day momentum of 1.6%; and
- Time stamped data on \$545 billion of trading by 18 organizations.

The graph shows that while a quarter of the orders reach the desk before the open, 35% of the orders are submitted after noon. In some of these firms the managers make an effort to get orders to



the desk early; more typical managers would show even heavier release of orders after noon.

Costs Increase Later in the Day



The next graph compares costs of orders released at the Open to orders released later in the day. Costs jump on average 45% after the opening auction, then decrease slowly, reflecting reduced momentum.

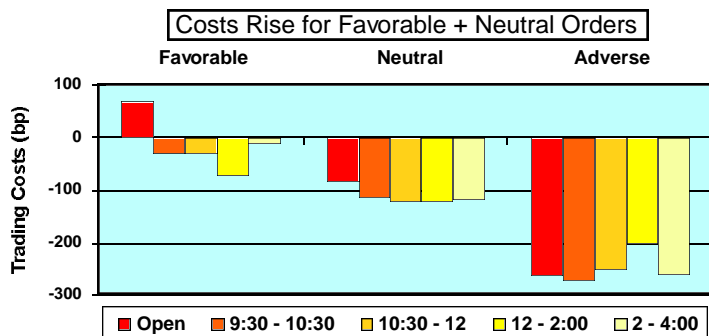
Momentum was strongest at the open in both NYSE and NASDAQ (1.8% and 3.9% respectively), and declined with each subsequent time slot. By the afternoon, costs started to come down, reflecting both the lower momentum and increased volume towards the close.

When we measure expected costs using Plexus' PAEG/L™ Benchmarks, we observe expected costs sliding downward during the day, reflecting the weakening momentum. However, the experienced trading costs gradually rise during the day. It appears that the increasing institutional market pressure during the afternoon hours more than offsets the fading momentum.

More on Momentum: Beware the Contrarian's Siren Song

We often speak of momentum as though it were a moving train that the trader is desperately running to catch. While that's more often true than not, situations arise where the trader supplies rather than consumes liquidity. As the next chart shows, that can result in trading gains.

However, as shown in the chart below, that good fortune appears only at the market open. In response to these favorable conditions, managers tend to release larger (and less liquid) follow-on orders in hopes of rapidly securing larger positions. The process soon becomes self-correcting: these orders reverse the supply/demand imbalance and costs quickly rise.



Favorable opportunities arise from liquidity imbalances. In one-sided markets, dealers are reluctant to provide liquidity without significant price concession. Once institutions start to supply liquidity, however, dealers either step back or begin to unwind their own positions. Competition leads to flattening or reversing prices – and increasing costs. The effect of delaying orders is especially problematic for small and mid-cap stocks, where costs for later orders exceeded costs for orders placed at the open by over 100 bp.

Conversely, Adverse orders exhibit flat or decreasing costs over the day. Note, however, that these orders are released at worsening prices, leading to a loss of net decision value to increasing manager timing costs. By the time the desk gets later orders, prices already moved enough to attract the other side. This is, of course, the flip side of favorable order behavior discussed above. Moreover, we see stronger returns for orders released after the open; this is the flip side of the contrarians who end up with deteriorating returns for late-in-the-day orders.

Very large orders, however, are an exception. Costs for very large orders rise over the day while returns deteriorate.

The biggest dangers arise when adding to existing orders during the day after the trader has asked the broker to go long or short. This desk goes into competition with the broker, and helps to force prices away. When faced with momentum, managers need to assess whether their information is important and immediate enough to pay the increased cost of trading. If the choice is to act, giving the traders a sense of the full amount of the order allows the desk to search for the least costly trading technique.

Conclusions:

We have shown that trading activity concentrates at the open and the close, while Managers spread order submission throughout the day. The result is increased costs for orders released after the open along with deteriorating results relative to PAEG/L.

- Releasing orders prior to the market opening gives the trading desk lead time to access liquidity.
- Favorable opportunities need to be treated with caution. Managers should release these on the open and avoid reacting in the middle of the day.
- Adverse orders do not show the same time penalty until orders exceed 200,000 shares. Releasing very large orders during the day creates costs exceeding PAEG/L benchmarks. Orders up to 200,000 shares can be released any time the motive warrants, but larger orders may have to wait until tomorrow's open to find liquidity.
- The smaller the cap, the greater the intraday price volatility. Unless there is an urgent need to trade, deferring trading until the next morning may encounter better liquidity.

Newly Updated Website www.plexusgroup.com:

New features include:

- **Our new motto:** *Building Better Performance*
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- **Tutorials** on the Plexus technology
- **Ask Wayne** -- Get answers to all your questions on implementation and trading costs.
- **New materials on Plexus Group:** our history, our mission, and employment opportunities.
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Join us at the Amelia Island Plantation, February 24-27, 2002. The complete program is available on the website.

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