Executive Summary

2014 Forecast:
- TradingVolumes in 2014 to increase.
- Thus, reversing a four (4) year trend of decreasing volume levels.
- Large Cap Trading Volume expected to increase +1.5% in 2014.
- Small Cap Trading Volume expected to increase +7.9% in 2014.

1Q 2014 Outlook:

Large Cap Stocks:
- Average daily volume rebounded +4% in 4Q 2013 and continued improvement is on the horizon.
- We forecast a quarter over quarter increase of +3% for 1Q 2014.
- This results in an increase to 4.27MM/shares/stock/day from 4.16MM/shares/stock/day.

Small Cap Stocks:
- Volumes jumped +14% in 4Q 2013 compared to 3Q 2014.
- We forecast a quarter over quarter increase of +7% for 1Q 2014.
- This results in an increase to 527K/shares/stock/day from 495K/shares/stock/day.
Executive Summary

Large Cap Trading Volume

- Large cap volumes in 2013 experienced another dismal year. On a year-over-year basis, 2013 volumes were down -16% from 2012, and 2012 volume levels were down -15% from 2011. Thus, in the last two years, large cap trading volume is down -28%.

- This also represents a decrease in Volume of -58% compared to the peak levels during the financial crisis.

- The good news is the decline is over. Volumes in 2014 are expected to increase (albeit, nominally) +1.5%. Daily stock volumes are expected to increase to 4.6MM/shares/day per stock in 2014 compared to 4.5MM/shares/day per stock in 2013.

- Large cap trading volumes have been found to be positively related to volatility and inversely related to price level. As volatility increases, investors tend to trade more shares as there is more opportunity to uncover superior investment opportunities and differentiate fund performance. As volatility decreases there is less opportunity for incremental returns and thus few shares traded. As prices increase, fixed dollar amounts will transact fewer shares and as prices decrease these fixed dollars will trade more shares. Furthermore, as volatility increases there is also additional need to rebalance portfolios to adhere to risk mandates and to minimize index tracking error.

- Large cap investment managers over the last couple of years have lacked any real portfolio manager conviction. Managers continue to invest a fixed dollar amount in the markets. Thus, as price levels increase few shares are able to be purchased or sold and as price levels decline more shares can be purchased or sold.

- The SP500 index was up 25%+ in 2013 coupled with relatively low volatility levels and was the cause for the reduction in volumes.
Executive Summary

Small Cap Trading Volume

- Small cap trading volumes in 2013 was relatively flat compared to 2012.
- On a year-over-year basis, daily stock volumes decreased only -0.35% to 475.3K/shares/day from 476.9K/shares/day.
- Since emerging from the financial crisis small cap trading volume has remained relatively stable (that is, no evidence of any increasing or decreasing trends) but with some fluctuations.

- Volumes in 2014 are expected to increase (dramatically) +7.9%. Daily stock volumes are expected to increase to 513K/shares/day per stock in 2014 compared to 475K/shares/day per stock in 2013. Small cap volumes have not experienced this level of year-over-year increasing volumes since just prior to the financial crisis.
- Small cap trading volume has been found to be proportional to both volatility and price level. As volatility level increases there is increased opportunity to uncover superior investment opportunities and an increase in prices levels attracts momentum investors.
- Small cap trading in 2013 continues to be a momentum driven tactic. These small and smid portfolio managers appear to be chasing returns and investment opportunities across the global markets – mostly emerging, latam, and frontier. And once the opportunity for increased returns in these markets has disappeared these managers flock back to safety – in these cases – US small cap stocks. Additionally, these managers also appear to be chasing small cap returns in the US markets. Thus small cap price increases attracts additional investors.
What is included in the report

- 2014 Forecasts for Large Cap and Small Cap Stocks (page 6)
- Monthly Volume Trends (page 7).
- Large Cap Quarterly Projections (page 8).
- Small Cap Quarterly Projects (page 9).
- Three-Month Forward Look Volume Analysis (page 10-12).
- Scenario & Sensitivity Analysis (page 13).
- Forecasting Methodology (page 14).

Analysis:

- We evaluated US trading volumes across large cap and small cap stocks from 2000 - present.
- The large cap stock universe was the SP500 and our small cap universe was the R2000 universe.
- Our volume metric was the average stock ADV in each market cap category.
Forecasted Change in Volumes: 2014

**Large Cap Stocks**
- Forecasted Change in Volume - Current Volatility

- At current volatility and price levels, 2014 large cap (LC) stock volume is expected to increase +1.5% over 2013.
- This results in an increase in daily volumes to 4.58MM/stock/day from 4.51MM/stock/day.
- Large cap trading volume has been found to be negatively related to price levels and positively related to volatility levels. Thus, as price levels increase, we may find a reduction in trading volume.

**Small Cap Stocks**
- Forecasted Change in Volume - Current Volatility

- At current volatility and price levels, 2014 small cap (SC) stock volume is expected to increase +7.9% over 2013.
- This results in an increase in daily volumes to 513KK/stock/day from 475K/stock/day.
- Small cap trading volume has been found to be closely related to overall returns opportunity, and investors appear to be chasing performance more with small cap stocks compared to large cap stocks. Thus, we expected volumes to increase with increasing price levels.
Monthly Volumes: 2000 through 2013

Large Cap Stock Volume (ADV):
- Large cap (LC) stock volume has been in steady decline since peaking during the final crisis of 2008-2009.
- Volume in 2013 was down -15% from 2012 volume levels. This represents a reduction of -58% compared to the peak levels during the financial crisis.
- However, the trend has begun to level off and we expect 2014 volumes to be in line with historical 2007 levels.
- Going forward, we expect 2014 Volumes to be 4.7MM shares per day per stock.

Small Cap Stock Volume (ADV):
- Small cap trading volumes have been relatively stable since emerging from the financial crisis – but with some periods of volume spikes. But recent statistical evidence finds that small cap volumes have already leveled off and is expected to increase into 2014.
- Volumes in 2013 were in-line with 2014.
- Going forward into 2014, we expect volumes to increase +7.9% to 513K per stock per day from 475K per stock per day. This is mostly driven by a risk-on risk-off strategy coupled with international trading.
Large Cap Stocks – Volume Forecasts – 2014

Annual Stock ADV:
- This graph shows average large cap ADV by year from 2000 through 2013, and expected volumes for 2014.
- Since peaking in 2008-2009, however, average stock volume has been trending downwards. 2013 volumes were down -59% from peak 2008-2009 levels.
- Volumes in 2013 were down -15.9% from 2012. This is in addition to volumes in 2012 being down -14.6% from 2011. Both were in-line with our volume forecast.
- In 2014, volumes are expected to finally level off. In fact, we expect a slight increase of +1.5%. This results in an increase to 4.58MM/shares/stock/day (2014) from 4.51MM/shares/stock/day.

Quarterly Stock ADV:
- This graph shows average ADV by quarter from 1Q 2011 through our current forecast.
- Average daily volume was uncharacteristically low in 3Q 2012 but did rebound +4% in 4Q 2013.
- We expected a quarter over quarter increase of +3% for 1Q 2014. This results in an increase to 4.27MM/shares/stock/day from 4.16MM/shares/stock/day.
Small Cap Stocks – Volume Forecasts – 2014

Annual Stock ADV:
- This graph shows average small cap ADV by year from 2000 through 2013, and forecasted volumes for 2014.
- Since emerging from the financial crisis of 2008-09, annual small cap stock volume has held relatively stable.
- There was a slight decline in 2012 (-9%) but 2013 held steady.
- 2014 small cap trading volume is projected to increase +7.9% to 513K/stock/day from 475/stock/day.
- Small cap trading volumes has not experienced this level of increase since pre-financial crisis.

Quarterly Stock ADV:
- This graph shows average ADV by quarter from 1Q 2011 through our current forecast.
- Average daily volume in 4Q 2013 was up +14% compared to 3Q 2013. This is exactly in line with our previous forecast of +15% increase in 4Q 2013 (which was counter to historical trends).
- 1Q 2014 volumes are expected to continue to increase +4% to 527K/stock/day from 495/stock/day.
Monthly Volume Change – Trends

January Large Cap Volume Trends:
- The graph to the left shows the change in month over month volume levels for large cap stocks from 2000 through present.
- Volumes in January have increased from December in each of the previous fourteen years as expected due to holiday slow-down.
- The largest increase was in 2008 prior to the financial crisis and the smallest increase was in 2013. The average January increase in volume is +18% compared to December averages.

January Small Cap Volume Trends:
- The graph to the left shows the change in month over month volume levels for small cap stocks from 2000 through present.
- January has experienced an increase in volumes in 13 out of the previous 14 months. The only year with a month over month reduction in volume for small cap trading volume was January 2009 which was in the middle of the financial crisis. December of that year was exceptionally high as many investors closed positions prior to year end.
- On average, small cap trading volume in January is up +10% compared to December.
Monthly Volume Change – Trends

**February Large Cap Volume Trends:**
- The graph to the left shows the change in month over month volume levels for large cap stocks from 2000 through present.
- February has historically experienced a decline in MOM volume levels. This was the case in 13 out of 14 months.
- The average February decline in volume was -6%.

**February Small Cap Volume Trends:**
- The graph to the left shows the change in month over month volume levels for small cap stocks from 2000 through present.
- Recently, volume fluctuation in February has been due to a risk-on risk-off strategy coupled with international investing where funds move in and out of small cap stocks and international markets to chase value opportunities.
- On average, small cap trading volume in February is down -2% compared to January.
Monthly Volume Change - Trends

March Large Cap Volume Trends:
- The graph to the left shows the change in month over month volume levels for large cap stocks from 2000 through present.
- Volumes change in March from February has not exhibited any trend which is counter to market belief that March volumes will be higher due to quarterly rebalancings.
- On average, volumes in March are up +2% from preceding February.

March Small Cap Volume Trends:
- The graph to the left shows the change in month over month volume levels for small cap stocks from 2000 through present.
- Similar to large cap volumes, March has not exhibited any consistent trend in change in volume levels. There was a period when small cap volume increased in March due to end of quarter trading activity, but we have seen a reversal over the last two years.
- Much of this change in trading patterns appears to be due to international investing and shifting from US small cap to international markets based on returns opportunity.
- On average, volumes in March are up +3% from preceding February.
Scenario Analysis: 2014

Large Cap Scenario Analysis: 2014
• The table to the left shows our large cap volume forecast for various volatility conditions and price levels.
• Large cap ADV is expected to increase +1.5% in 2014 (at current volatility and price levels).
• Volume levels could range from -6% (low volatility and high prices) to +34% (high volatility and low prices).
• Large cap volumes have exhibited a positive relationship with volatility and negative relationship with price trends.
• Funds have been increasing their trading in times of increasing volatility as a means to differentiation themselves. Funds have also been decreasing their trading in times of increasing prices which may suggest that there is a finite dollar amount available for trading. Thus, as prices increase few shares are transacted and as prices decrease more shares are transacted. Additionally, managers may not see a need to rebalance portfolios in rising markets.

<table>
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<th>Volatility</th>
<th>Avg S&amp;P Price Range</th>
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<td>22.0%</td>
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<tr>
<td>High</td>
<td>33.9%</td>
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Small Cap Scenario Analysis: 2014
• Small cap volume is expected to increase +7.9% in 2014 (at current volatility and price levels).
• The increase in small cap volume could be as high as 24%-25% with increasing price and volatility – which denotes opportunity for increased performance. A low probability scenario only has small cap volumes decreasing -1% due to low prices and low volatility – i.e., less of a chance for increased performance.
• Small cap trading continues to be at least a somewhat momentum driven strategy.

<table>
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</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 1800</td>
</tr>
<tr>
<td>Low</td>
<td>-1.0%</td>
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<tr>
<td>Medium</td>
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<tr>
<td>High</td>
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Forecasting Methodology

- Forecasts were generated using fourteen (14+) years of data: 2000 through 2013.
- Average daily volume (ADV) at the stock level was computed for large cap (SP500 Index) and small cap (R2000 Index) stocks.
- An ARMA statistical model was used to determine the relationship between the change in monthly volume levels and a set of explanatory factors.
- Volume level data used in our forecast was the average daily volume (ADV) per stock per day. For example, in 2012 the average daily volume for a large cap stock was 5.4MM shares per stock per day and the average daily volume for a small cap stock was 477K shares per stock per day.
- Explanatory Factors:
  » Auto-Regressive volume term (monthly change in volume), Seasonal Effect, Change in Volatility, Change in SP500 Index Level
- Key Findings:
  » Large and small cap stock volume has also exhibited a volume trend-reversal, where increasing volume months are followed by decreasing volume months. This is an indication of a risk-on and risk-off investment environment.
  » Large and small cap stock change in volume is positively related to changing volatility levels.
  » Large cap volumes were negatively sensitive to price levels with volumes decreasing with increasing prices. This is an indication of a fixed dollar amount allocated to large cap investing regardless of market conditions. Small cap volumes were slightly positively related to price levels with volumes increasing with increasing prices. This is an indication of managers employing momentum strategies with small cap stocks.
  » Correlation levels did not prove to be a predictor of volume for large or small.
- Forecasting Accuracy:
  » Large cap: R2 = 0.56, error = 8.5% (month)
  » Small cap: R2 = 0.35, error = 8.8% (month)
- Forecasts were generated using Monte Carlo Simulations using historical distributions and also pairs of change in volatility and SP500 index movement coupled with our statistical ARMA mode sensitivities and lagged variables. This provided the various volume levels shown in the sensitivity analysis table for large cap and small cap stocks.
Kissell Research Group – Recent Publications

The Science of Algorithmic Trading and Portfolio Management, Robert Kissell, (Elsevier, 2013). This text provides traders, portfolio managers, analysts, students, practitioners, and financial executives with an overview of the new electronic trading environment, and insight into how algorithms can be utilized to improve execution quality and fund performance. The book provides a discussion of the current state of the market and advanced modeling techniques for trading algorithms, stock selection and portfolio construction. Furthermore, the book provides insight into “best in class” methodologies for building, constructing, and evaluating algorithms, and insight into proper algorithmic forecasting techniques. The book provides the foundation for many of the forecasting models embedded in black-box models and used by today’s successful high frequency traders.

Multi-Asset Risk Modeling: Techniques for a Global Economy in an Electronic and Algorithmic Trading Era, Morton Glantz and Robert Kissell, (Elsevier, 2013). This text provides an introduction to the latest and most advanced risk modeling techniques for equities, debt, fixed income, futures and derivatives, commodities, and foreign exchange, as well as advanced algorithmic and electronic risk management. By giving coherent recommendations about which statistical models to use for which asset class, this book makes a real contribution to the sciences of portfolio management and risk management.

Multi-Asset Trading Costs, Robert Kissell, Journal of Trading, Fall 2013, Vol. 8, No. 4
This article provides insight into recent transaction cost trends across multi-asset trading classes. The article provides an in-depth analysis of trading across: Equities, ETFs (Liquid and Illiquid), Futures, Gov’t Bonds, Corporate Bonds, Commodities and Currencies, and also provides a long-term Trading Cost Index from 1990 - 2013 across the Global Markets (US, Canada, Developed, Emerging, Frontier, and Latam).

The Journal of Trading provides free registration and access to the paper at: http://www.iijournals.com/toc/jot/current

Smart Technology for Big Data, Michael Blake, Journal of Trading, Winter 2014, Vol. 9, No. 1
This article provides an underlying structure for managing the big data phenomenon. Innovations and tools fundamental to handling big data are highlighted, and we look at how these technologies are being implemented in the financial industry.

The Journal of Trading provides free registration and access to the paper at: http://www.iijournals.com/toc/jot/current
References

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