Deutsche Bank
Markets Research

North America
United States

Quantitative Strategy
The Quant View: Small Cap Edition

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Updating our best quant ideas for small caps

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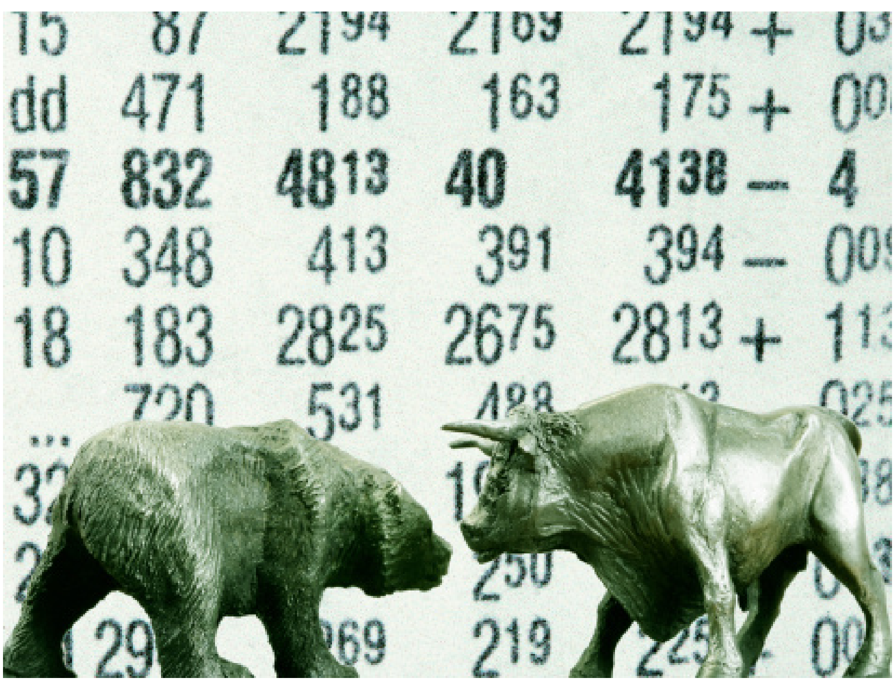
Quantitative macro and micro forecasts for this month
In this report we present our latest small cap quantitative forecasts for the coming month. Our models are designed to generate both bottom-up stock selection ideas as well sector rotation and market timing calls.

Potential implications of Fed QE tapering
This was a volatile month for equities as the FOMC announcement on June 19 hinted at the potential Fed tapering of bond purchases. In this report, we analyze the ramifications of potential Fed QE tapering on quantitative factors.

Quant factor implications: Be cautious of high dividend yielding stocks
We are interested in how quant factors and strategies perform around the Fed signaling of QE tapering. Can we learn something from the (admittedly short) history of such actions? Our key finding is that – as one might expect – the signaling of QE tapering triggered a sharp selloff in high dividend yield stocks.

But VRP can help investors navigate volatile markets
We discuss how a market timing indicator called the Variance Risk Premium (VRP) can potentially help investors navigate these volatile markets brought on by events such as the signaling of QE tapering.



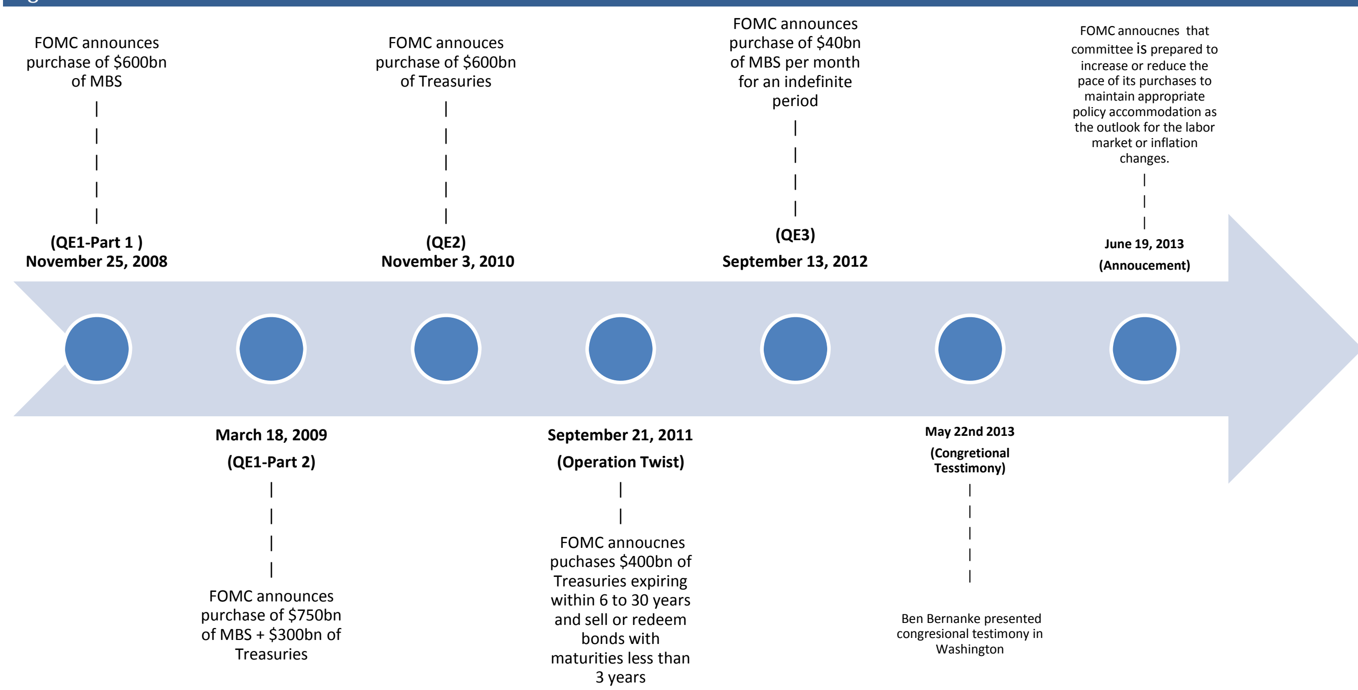
Source: *gettyimages.com*

A Quant's View on QE Tapering

The backdrop of FED Tapering

The dire ramifications of the 2008 global financial crisis forced governments across the world to act quickly and swiftly to stabilize threatening levels of market deterioration and panic. Subsequent to the crisis, most global economies were suffering from high unemployment, crashing housing prices, and negative to stagnant economic growth. To combat these conditions, governments across the world employed conventional and non-conventional stimulative monetary policy to avoid crippling economic consequences. The Federal Reserve (Fed) responded by lowering the targeted Federal Funds rate and discount rate, and furthermore initiated a series of capital injections into the economy know as quantitative easing (QE). During the past five years, the Fed has implemented a series of QE efforts in order to stabilize and stimulate the economy. Officially, the Fed has announced three rounds of QE. Figure 1 shows a timeline of Fed announcements surrounding QE.

Figure 1: Timeline of QE announcements

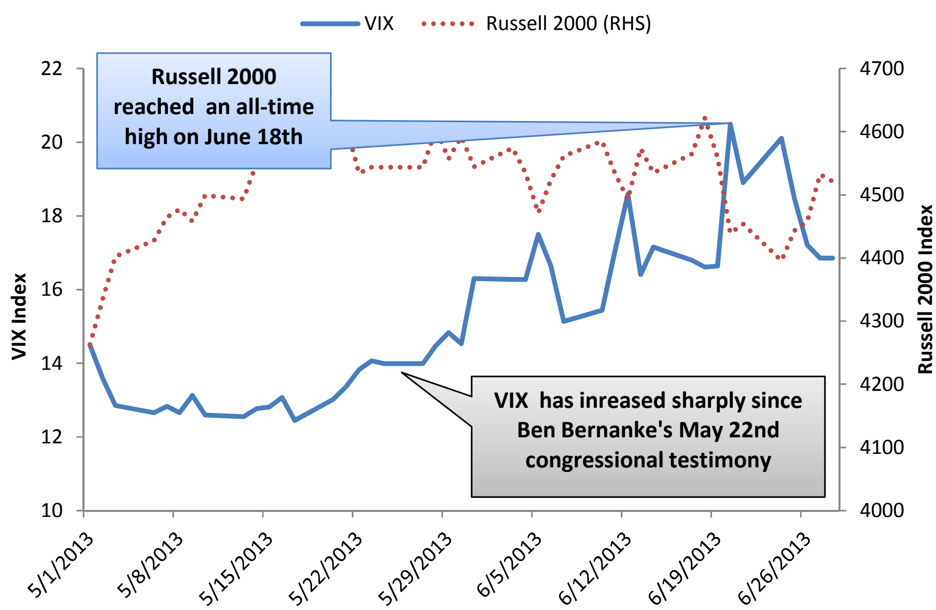


Source: Deutsche Bank

The benefits of QE have and will continue to be a hotly debated topic by investors, economists, and academics alike. However, arguably the Fed's asset purchases throughout these rounds of QE have provided some benefit to the overall market and economy. Unemployment has fallen to 7.6% from a high of 10% in October 2009. Market conditions have strongly improved. The Russell 2000 index is up approximately 14% YTD. In fact the Russell 2000 index reached an all time high on June 18, 2013.

As such, it no surprise that investors reacted strongly to Ben Bernanke's comments suggesting the potential reduction in bond purchases by the central bank if market conditions continue to improve. The hint that QE may be dialed down by the Fed did not sit well with investors. Figure 2 shows the sharp increase in volatility since Ben Bernanke's congressional testimony in Washington on May 22. The VIX has increased by approximately 30% since May 22.

Figure 2: VIX levels during May and June of 2013



Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

In a previous publication, Jussa *et al* [2012][1] we showed the implications of QE1, QE2, and QE3 on the performance of quantitative factors. In this report, we take the opposite viewpoint and analyze the ramifications of potential Fed QE tapering on quantitative factors. Specifically, we are interested in on how style portfolios performed leading into, during, and post Ben Bernanke's comments (on May 22 and June 19 of 2013) signaling a potential reduction in QE efforts. This may help investors gauge the potential consequences to quantitative factors and stylized portfolios should the Fed proceed to taper bond purchases.

Setting up the analysis

To better grasp the impact of QE tapering from a quant's perspective, we perform a detailed event study analysis on a number of different quant factors pre and post the May 22 and June 19 announcement dates. Essentially we track the performance of various different factor style portfolios in the days leading up to and after these dates. We select a diverse blend of individual factors that include value, growth, momentum, sentiment, reversal, and low volatility styles. We track the performance of these individual style portfolios 30 business days prior to and post the announcement date. Our factor style portfolios are long/short portfolios. These are formed by taking a long position in the top decile and a short position in the bottom decile of stocks based on the individual style factors (e.g. momentum, value, etc.). Our universe of study is the

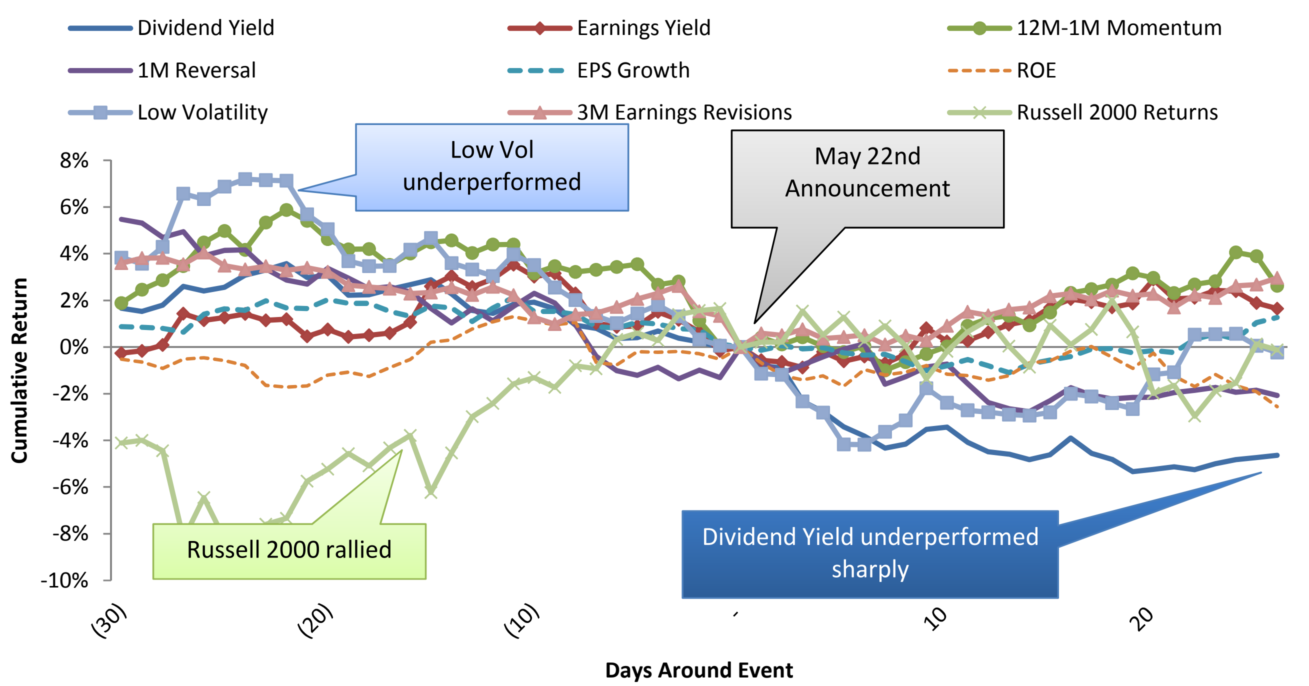
[1] Jussa et al., 2012, "Emerging Issues: QUANTitative Easing", *Deutsche Bank Quantitative Strategy*, 28 September 2012.

Russell 2000. While we have a limited number of events to work with, we are particularly interested in indentifying any post-event trends in factor performance that might help us position ourselves for potential QE tapering.

May 22

First we look at factor and market performance surrounding May 22 2013. Figure 3 shows the results of our event study analysis. The lead up to the May 22 announcement showed signs that investors were somewhat optimistic. The Russell 2000 rallied and low volatility stocks sold off. However, the aftermath was somewhat of a mixed picture. Dividend yielding stocks sharply underperformed post May 22.

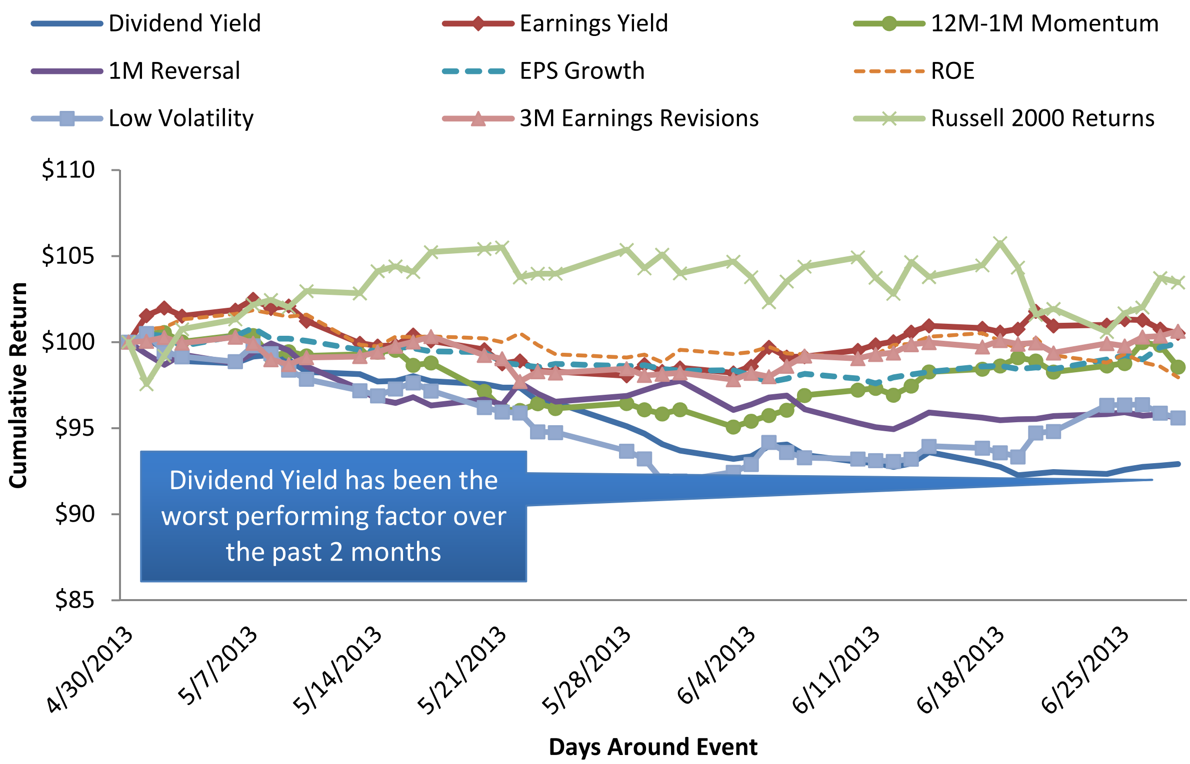
Figure 3: Factor performance surrounding May 22



Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

This is not too surprising as 10 year treasury yields have risen by approximately 100bps in the month of June and under the backdrop of potential QE tapering, high yield strategies have severely underperformed. In fact, dividend yield has been the worst performing factor within the past two months (Figure 4). This may be a result of the fact that dividend yielding stocks may be relatively less attractive to investors as bond yields increase with rising interest rates.

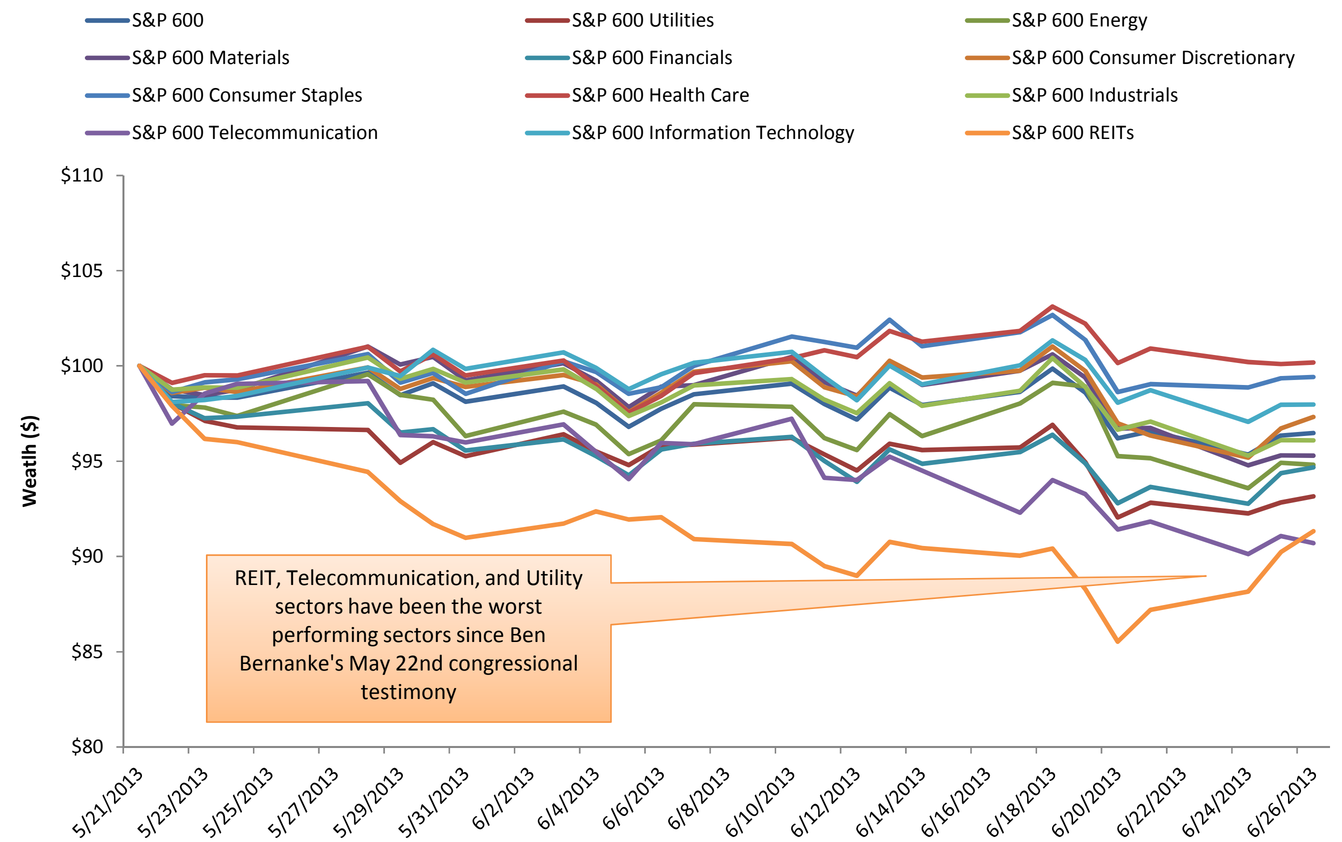
Figure 4: Factor performance during the past 2 months



Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

The underperformance of dividend yielding stocks can further be seen by analyzing the performance of individual sectors. Figure 5 shows the performance of the various S&P 600 sector indices in the days following Ben Bernanke's congressional testimony on May 22. We can clearly see that the REITs, Telecommunication, and Utility sectors (all high dividend paying sectors) have been the worst performers among all the S&P 600 sector indices. The underperformance of dividend yielding stocks is a reoccurring theme as we will see next when we analyze factor performance surrounding Ben Bernanke's June 19 announcement.

Figure 5: S&P 600 sector performance



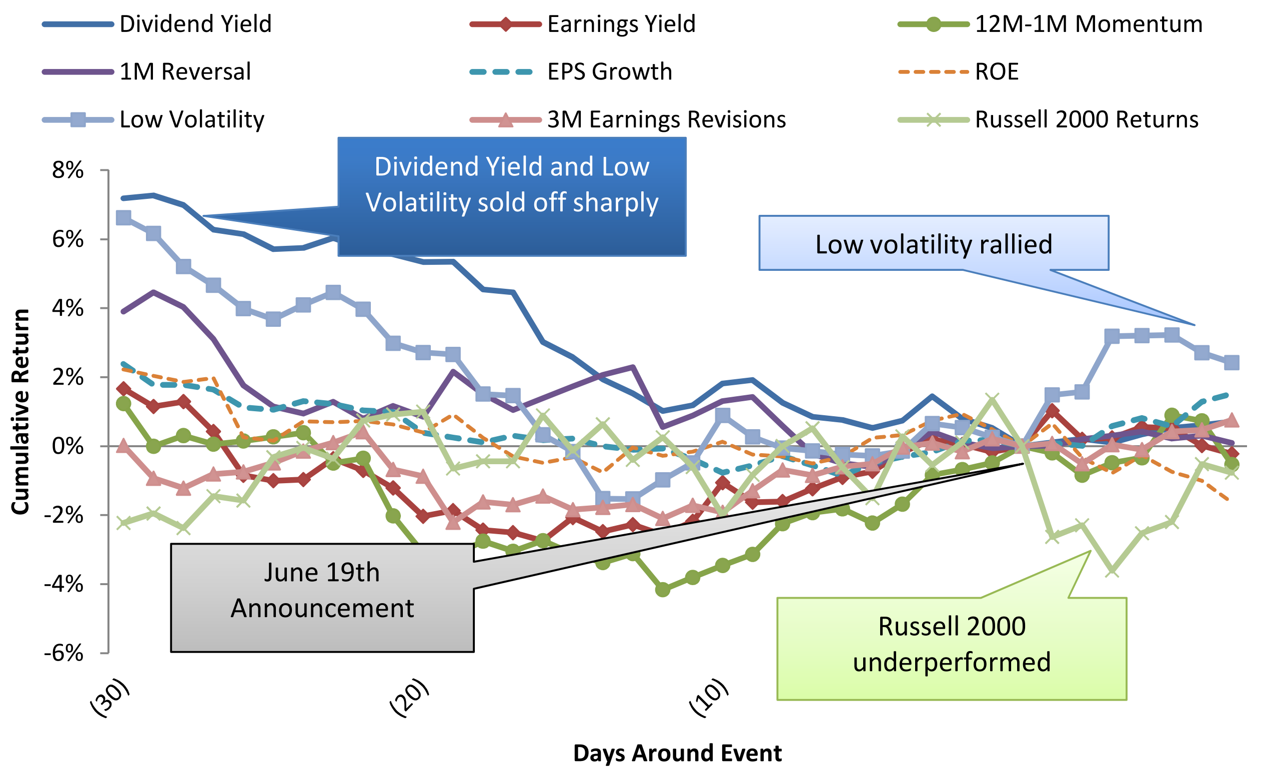
Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

June 19

Figure 6 shows the results of our event study analysis surrounding Ben Bernanke's June 19 announcement. The lead up to the June 19 announcement showed a sell-off in dividend yield and low volatility strategies, likely the remnants of the May 22 announcement. Interestingly, the aftermath of the June 19 announcement showed some signs of a flight to safety as the market sank while at the same time low volatility sharply recovered. Could this flight to safety be an indication of what factors or strategies will outperform if the Fed does eventually commence QE tapering? The reality is that we do not know. In fact, we do not have enough events, history, or data points to determine if this is a reoccurring and viable theme post a potential Fed QE tapering. However, not all hope is lost.

What we clearly observed in this study is that the markets tend to be highly volatile during such episodes. For example, we saw a sharp selloff in low volatility strategies prior to the June 19 announcement followed by a rally during the aftermath. This rapid switching from risk seeking to, risk averse behavior, triggered by QE tapering announcements, may be better cushioned by timing indicators that can potentially predict and time market turning points. Next, we discuss how a market timing indicator called the Variance Risk Premium (VRP) can potentially help investors navigate volatile markets brought on by the signaling of potential QE tapering.

Figure 6: Factor performance surrounding June 19



Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

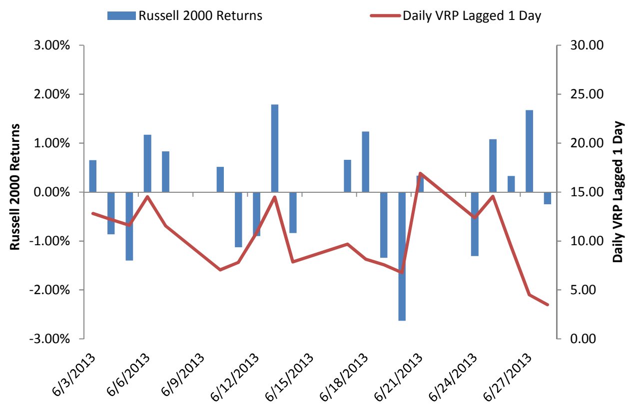
Navigating volatile markets through market timing

Our Variance Risk Premium (VRP) indicator is a contrarian indicator that measures market overreaction and underreaction to realized risk. In simple terms, VRP is the difference between options-implied risk (i.e., the VIX index) and realized risk (i.e., the actual risk in the market measured historically over the last month). If VRP is high, we see this as a buying opportunity for risky assets, like equities and high yield bonds. Why? The intuition is as follows. When VRP is high, VIX has typically shot up dramatically (i.e. the market is in panic mode). At the same time, realized risk has probably also risen, but not to the same extent. In other words, the market has overreacted relative to what the actual, realized data is telling us. Our research shows that such episodes are good buying opportunities for risky assets on about a three month horizon.[2] On the other hand, when VRP is low, it tends to be a complacency indicator: investors are failing to price in rising realized risk in the market, and as a result we should be selling risky assets like equities.

We can calculate our VRP indicator at a monthly or daily frequency. Generally we pay attention to the monthly VRP when it hits extreme levels (like +/- 2 standard deviations). However, we find that our daily VRP is a good indicator of market movements or turning points at smaller deviation levels. Figure 7 shows our daily VRP indicator (lagged by 1 day) overlaid with the Russell 2000 returns. During the month of June, the daily VRP indicator showed forecasting power in predicting market turning points.

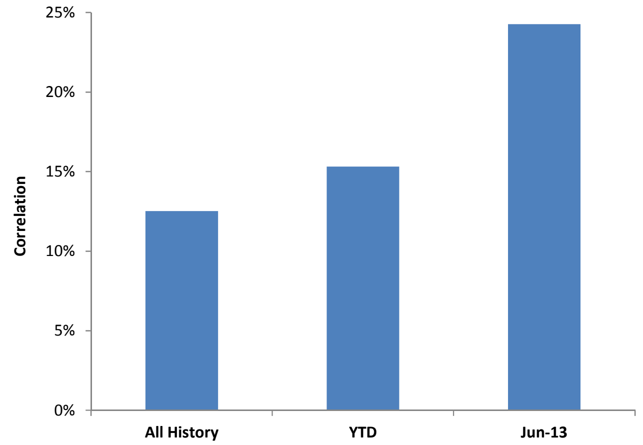
[2] For more details on the VRP, including our backtesting work, see: Luo et al., 2011, “Signal Processing: Quant Tactical Asset Allocation (QTAA)”, *Deutsche Bank Quantitative Strategy*, 19 September 2011.

Figure 7: Recent VRP (lagged) and market returns



Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 8: Correlation to 1 day lagged VRP and Russell 2000 returns



Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

We can see this more clearly in Figure 8 which shows the correlation between the 1 day lagged VRP and our Russell 2000 daily. The correlation rose strongly in the month of June indicating that the VRP has stronger predictive power in more volatile markets as precipitated by the QE tapering announcements in late May and June.

Concluding remarks

Stepping back and looking at the big picture, the above analysis illustrates a number of the points we have been trying to make in our research over the past few years. We believe based on our past research that the key message is the importance of actively managing and understanding the risk exposure of one's portfolio. This is important at all times of course, but is especially crucial when the market is rapidly switching from risk-on to risk-off and vice versa; i.e. precisely the type of rapid regime switches that are triggered by QE-tapering announcements and events.

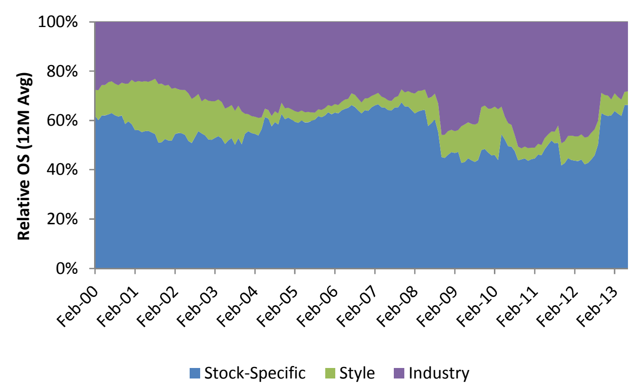
Small caps, big opportunity

In this month's "The Quant View: Small Cap Edition" we analyze various quantitative and fundamental models to show that there is greater stock level differentiation among smaller cap stocks, which presents alpha opportunities for investors. This monthly publication will also point out the various noteworthy observations from our models specifically for small cap stocks. For this report, we will use the Russell 2000 index to define our small caps universe. Where we compare to large caps, we will use the Russell 1000 as our proxy.

The small cap opportunity set

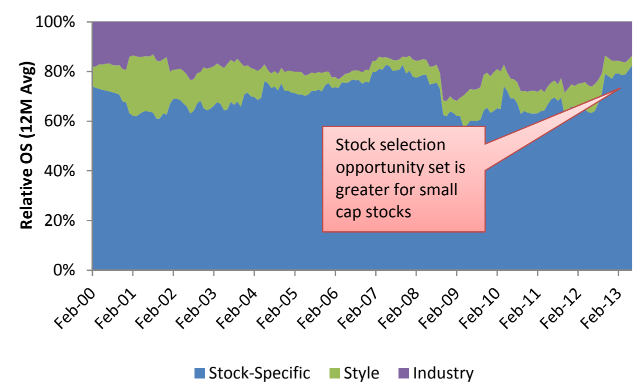
We think of the opportunity set as the total available alpha on the table. Our main interest is to understand what is driving that opportunity, because this can allow us to position our strategies to pick in the orchard with the juiciest fruit. In Figure 9 we show the opportunity set for the large cap universe, and in Figure 10 we show the opportunity set for the small cap universe.

Figure 9: Large cap opportunity set



Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 10: Small cap opportunity set



Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

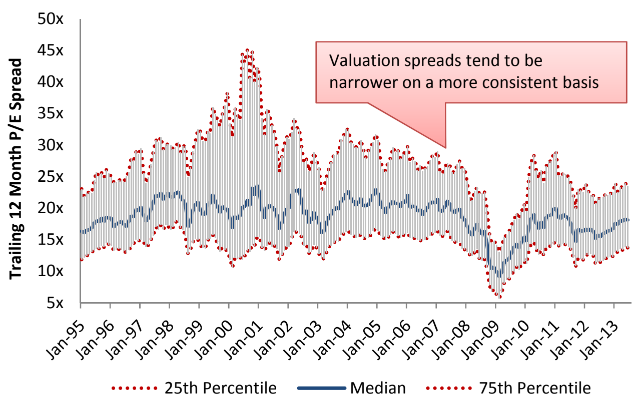
Both charts actually tell a similar story. The key result is the size of the blue portion relative to the other colors. The blue represents the opportunity explained by stock selection, whereas we can think of the other colors as representing the opportunity from top-down calls like picking industries and styles. When the financial crisis exploded in 2008, we moved into a much more macro-dominated world. As a result, the portion of overall opportunity that could be explained by individual company characteristics (e.g., valuation, growth profile, earnings quality, etc.) shrunk sharply; no one cared if a stock looked good on fundamentals if it was exposed to Europe for example. Needless to say, such an environment was challenging for quants and non-quants alike, since both camps tend to use stock specific information to differentiate between stocks.

However, the good news is that both charts show that bottom-up stock picking is making a strong comeback. The blue area in both charts has reached levels last seen in 2007. The crucial observation is that the relative opportunity coming from stock selection is higher for small cap stocks. In other words, this universe is particularly fruitful for managers with skill in picking individual stocks. Note that the relative opportunity set has remained relatively steady during the past month for small caps.

Valuation spreads

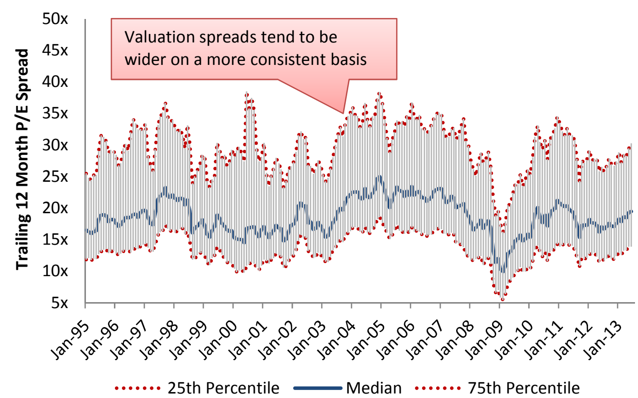
Similar to the opportunity set, valuation spreads allow investors to gauge the level of stock selection opportunity in the market. Widening valuation spreads typically indicate more stock-level differentiation and therefore a better environment for stock selection. On the other hand, narrowing valuation spreads are indicative of lower levels of stock differentiation. Figure 11 and Figure 12 show the median, 25th percentile, and 75th percentile of trailing price to earnings for the Russell 1000 and 2000 index constituents. Interestingly, we see that valuation spreads are wider on a more consistent basis for small cap stocks. This reinforces the earlier evidence we saw in the opportunity set; the small cap space is rich with opportunity for skilled stock pickers. Note that during the past month, valuation spreads have remained fairly consistent within small caps.

Figure 11: Large cap valuation spreads



Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 12: Small caps valuation spreads

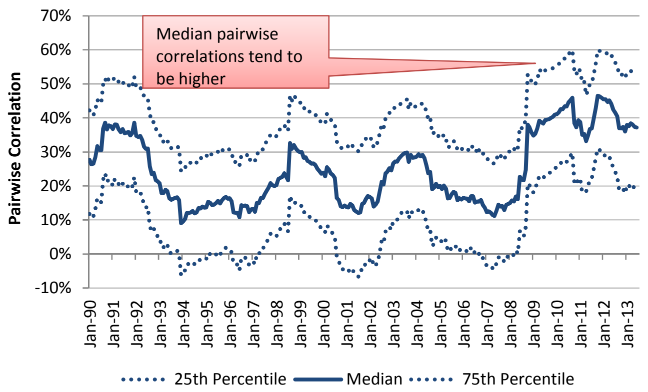


Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Keeping an eye on correlations

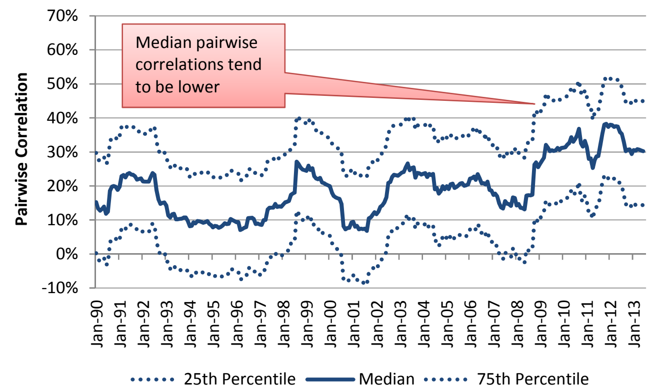
Closely related to the opportunity set and valuation spreads is the median pairwise correlation among stocks in the market. This is calculated by taking every possible pair of stocks, and computing the correlation of their monthly returns based on the past 24 months of data, and then taking the median across all the pairs. Figure 13 shows the median pairwise correlation for large caps. While it has come down from the peak in the financial crisis, it is still relatively high compared to its long-term average, so investors are not yet completely out of the woods. Interestingly, in general median pairwise correlations for small cap stocks (Figure 14) tend to be lower when compared to large cap stocks. This tells us that small cap names tend to trade more on their own merits, rather than being driven by common factors. Note that during the past month, medium pairwise correlations have remained relatively steady within small caps.

Figure 13: Median pairwise correlation for large caps



Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 14: Median pairwise correlation for small caps



Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

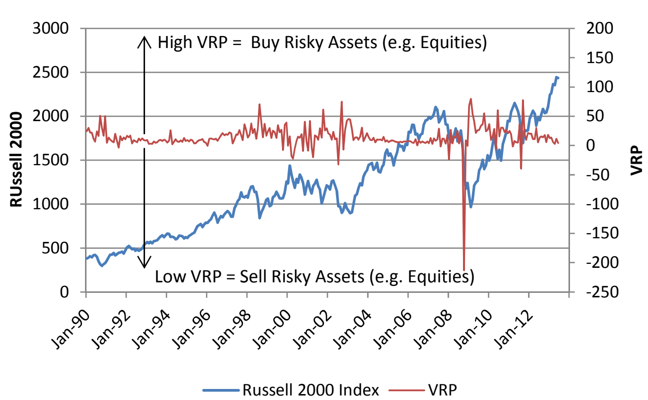
Macro update

Our results so far indicate that the small cap world is a favorable environment for applying stock picking skill. But market timing is also important. Picking good stocks is nice, but when everything is falling even doing that is sometimes not enough. What kind of quant tools can we use to do market timing?

Our favorite market timing indicator

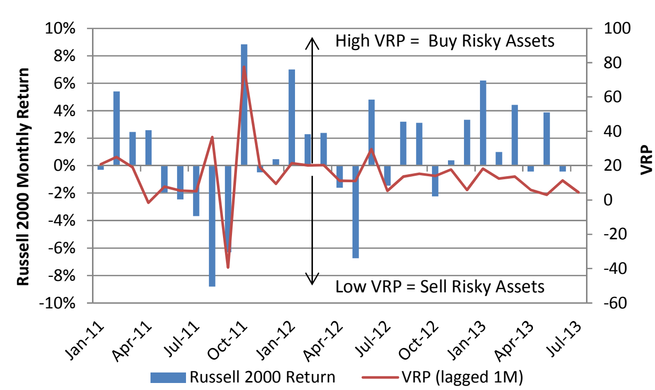
Our Variance Risk Premium (VRP) indicator is a contrarian indicator that measures market overreaction and underreaction to realized risk. Today our VRP indicator is reading 4, compared to a long-term average of 14.3. The VRP has edged downward since last month's reading of 11 suggesting that a degree of caution is warranted. Generally we pay attention to the VRP when it hits extreme levels (like +/- 2 standard deviations).

Figure 15: Variance Risk Premium (VRP)



Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 16: Recent VRP (lagged) and market returns



Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

The Small Cap Dashboard

Which styles have been working in small caps?

This month we highlight the DB Small Cap Dashboard, an easy-to-use cheat sheet that shows which styles have been working within small cap stocks. We track cumulative factor performance year-to-date, and highlight what we think are the noteworthy observations. Figure 17 shows the results for small caps.

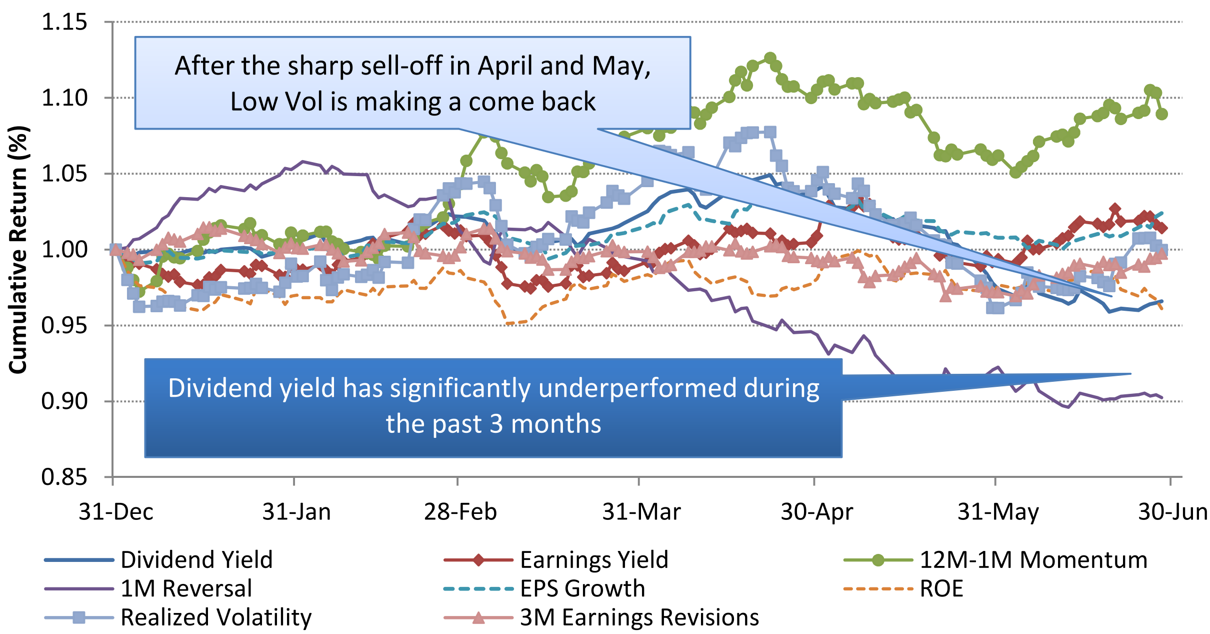
A few important themes emerge from the dashboard this month.

- Since April, low volatility has sold off sharply. However, after the FOMC announcement on June 19th, low volatility is making a sizeable comeback.
- Dividend yield has sold off sharply since the end of April. In fact, since the end of April, dividend yield is one of the worst performing factors.

For more details see our website

For the most recent daily factor performance, as well as factor performance delineated by different universes (e.g., large cap, small cap) and regions, please see our Global Quantitative Strategy website at https://eqindex.db.com/gqs/. Note that you need a username and password to log on to this website. If you don't have login details, please contact us at DBEQS.Americas@db.com and we'd be happy to set you up.

Figure 17: Small Caps (Russell 2000): YTD cumulative factor performance (Q10-Q1 return spread)



Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Bottom-up stock selection

Top stock picks from our QCD stock selection model

- The QCD model is our flagship stock selection model for U.S. small cap equities.
- The model incorporates a number of unique features including dynamic factor selection, a non-linear TREE component, and active style and sector rotation.
- For complete details on the model, please see Luo et al., "QCD Model: DB Quant Handbook", 22 July 2010.

Current stock recommendations

Figure 18 shows the best 20 buy ideas and sell ideas from today's model. Note that a complete ranking for all Russell 2000 stocks is available in spreadsheet format. If you would like to get a copy of the spreadsheet, please contact us at DBEQS.Americas@db.com.

Figure 18: Current QCD model stock recommendations fro Russell 2000 universe

BEST BUY IDEAS (SECTOR NEUTRAL)

Ticker	Name	CUSIP	GICS Sector	QCD Score (higher is better long)
SRI	STONERIDGE INC	86183P102	Consumer Discretionary	14.7%
NFP	NATIONAL FINANCIAL PRTNRS CP	63607P208	Financials	13.5%
SMP	STANDARD MOTOR PRODS	853666105	Consumer Discretionary	13.1%
TREE	TREE.COM INC	894675107	Financials	13.0%
CCIX	COLEMAN CABLE INC	193459302	Industrials	12.8%
RUSHA	RUSH ENTERPRISES INC	781846209	Industrials	11.2%
OMI	OWENS & MINOR INC	690732102	Health Care	10.4%
USNA	USANA HEALTH SCIENCES INC	90328M107	Consumer Staples	9.4%
MED	MEDIFAST INC	58470H101	Consumer Staples	9.3%
MOH	MOLINA HEALTHCARE INC	60855R100	Health Care	9.2%
DK	DELEK US HOLDINGS INC	246647101	Energy	6.6%
VG	VONAGE HOLDINGS CORP	92886T201	Telecommunication Services	6.4%
NWE	NORTHWESTERN CORP	668074305	Utilities	5.7%
WNR	WESTERN REFINING INC	959319104	Energy	5.5%
LG	LACLEDE GROUP INC	505597104	Utilities	5.2%
WOR	WORTHINGTON INDUSTRIES	981811102	Materials	5.1%
GPK	GRAPHIC PACKAGING HOLDING CO	388689101	Materials	4.3%
CBR	CIBER INC	17163B102	Information Technology	3.3%
IDT	IDT CORP	448947507	Telecommunication Services	2.7%
EEFT	EURONET WORLDWIDE INC	298736109	Information Technology	2.6%

BEST SELL IDEAS (SECTOR NEUTRAL)

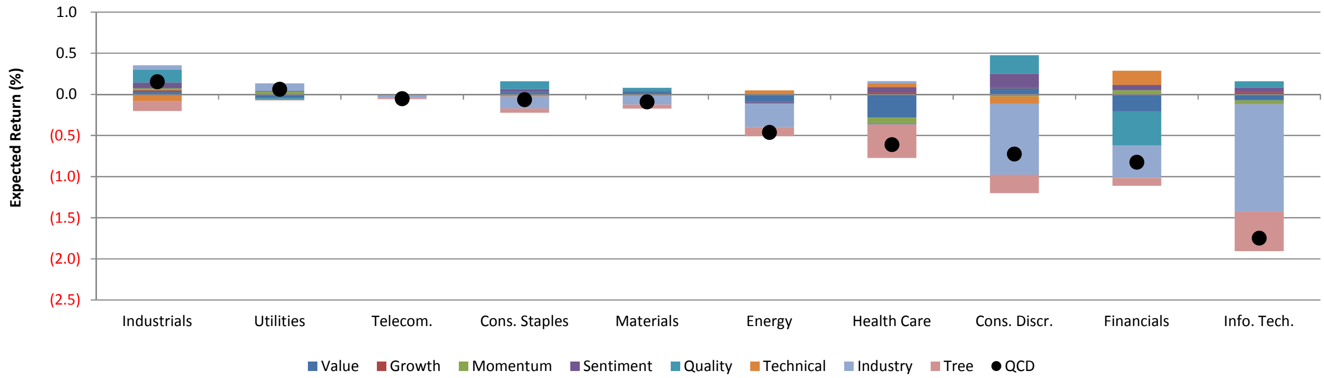
Ticker	Name	CUSIP	GICS Sector	QCD Score (lower is better short)
STEC	STEC INC	784774101	Information Technology	-39.4%
RBCN	RUBICON TECHNOLOGY INC	78112T107	Information Technology	-37.5%
ETRM	ENTEROMEDICS INC	29365M208	Health Care	-35.8%
CERE	CERES INC	156773103	Energy	-35.2%
AUMN	GOLDEN MINERALS CO	381119106	Materials	-33.6%
URZ	URANERZ ENERGY CORP	91688T104	Energy	-33.4%
ZIOP	ZIOPHARM ONCOLOGY INC	98973P101	Health Care	-31.4%
TWER	TOWERSTREAM CORP	892000100	Telecommunication Services	-28.7%
GMO	GENERAL MOLY INC	370373102	Materials	-27.3%
MNTG	MTR GAMING GROUP INC	553769100	Consumer Discretionary	-24.8%
GNK	GENCO SHIPPING & TRADING	Y2685T107	Industrials	-24.5%
ZAGG	ZAGG INC	98884U108	Consumer Discretionary	-23.9%
WAC	WALTER INVESTMENT MGMT CORP	93317W102	Financials	-23.8%
GSVC	GSV CAPITAL CORP	36191J101	Financials	-22.5%
AMSC	AMERICAN SUPERCONDUCTOR CP	030111108	Industrials	-22.4%
LEAP	LEAP WIRELESS INTL INC	521863308	Telecommunication Services	-22.2%
NGVC	NATURAL GROCERS VITAMIN CTGE	63888U108	Consumer Staples	-19.3%
BDBD	BOULDER BRANDS INC	101405108	Consumer Staples	-17.4%
AT	ATLANTIC POWER CORP	04878Q863	Utilities	-16.1%
CDZI	CADIZ INC	127537207	Utilities	-13.1%

Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Current sector recommendations

The QCD model also implicitly makes sector predictions. Figure 19 shows the current ranking of the 10 GICS Level 1 Sectors, ranked from best (most likely to outperform this month) to worse (least likely to outperform). The bars show the key drivers for each call.

Figure 19: Current QCD sector recommendations for Russell 2000 universe

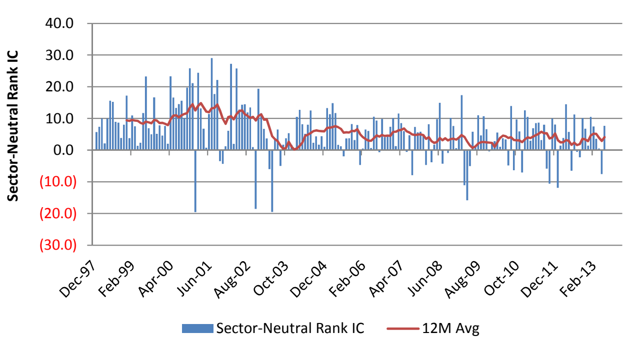


Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Small cap model performance

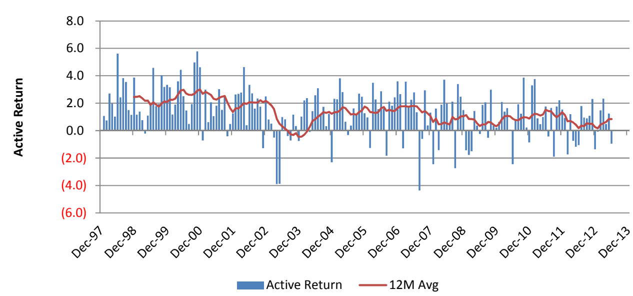
The QCD model has performed well since inception. Figure 20 shows the pure signal performance, measured as a monthly sector-neutral rank information coefficient (IC). Figure 21 shows the performance of an actual model portfolio, after costs, based on a realistically optimized market-neutral strategy.

Figure 20: Model performance, sector-neutral rank IC



Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

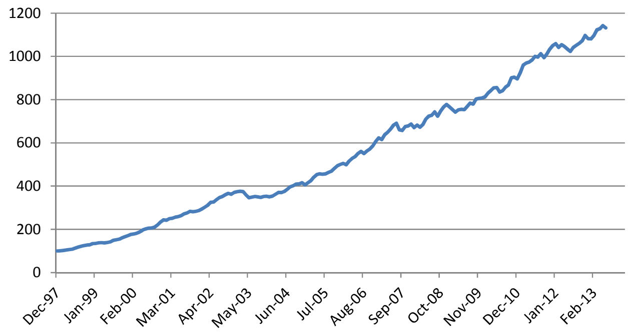
Figure 21: Model portfolio active return, after costs



Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

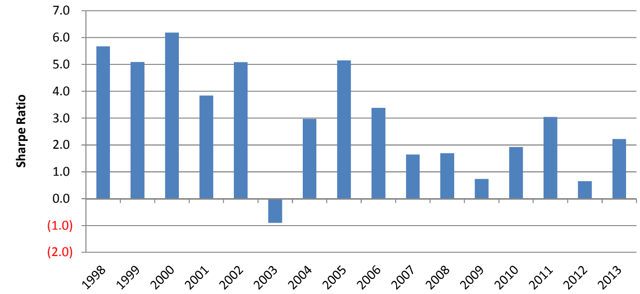
Figure 22 shows the cumulative performance of the optimized strategy, and Figure 23 shows the annualized Sharpe ratio (after costs) by calendar year.

Figure 22: Model portfolio cumulative, after costs



Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 23: Annualized Sharpe ratio, after costs



Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Top stock picks from our N-LASR global stock selection model

- The N-LASR model is our flagship stock selection model for small cap equities.
- The model is based on a machine learning algorithm called AdaBoost, and is designed to adaptively learn which factors to use, often in a non-linear way.
- For complete details on the model, please see Wang et al., "Signal Processing: The Rise of the Machines", 5 June 2012.

Current stock recommendations

Figure 24 shows the best 20 buy ideas and sell ideas from today's model. Note that a complete ranking for all small cap stocks is available in spreadsheet format. If you would like to get a copy of the spreadsheet, please contact us at DBEQS.Americas@db.com.

Figure 24: Current N-LASR model stock recommendations for Russell 2000 universe

BEST BUY IDEAS

Ticker	Name	SEDOL	County	N-LASR Score (higher is better long)
FISI	FINANCIAL INSTITUTIONS INC	2596949	USA	1.76
KOP	KOPPERS HOLDINGS INC	B0X46B1	USA	1.66
MSFG	MAINSOURCE FINL GROUP INC	2475156	USA	1.61
FCBC	FIRST CMNTY BANCSHARES INC	2648710	USA	1.60
HMN	HORACE MANN EDUCATORS CORP	2437112	USA	1.55
SRCE	1ST SOURCE CORP	2341848	USA	1.55
FIBK	FIRST INTERSTATE BANCSYSTEM	B4RGHN0	USA	1.54
EE	EL PASO ELECTRIC CO	2851808	USA	1.44
HFWA	HERITAGE FINANCIAL CORP	2619880	USA	1.44
CHFC	CHEMICAL FINANCIAL CORP	2190277	USA	1.43
PERY	ELLIS PERRY INTL INC	2851701	USA	1.43
SXT	SENSIENT TECHNOLOGIES CORP	2923741	USA	1.41
COBZ	COBIZ FINANCIAL INC	2257752	USA	1.39
SCBT	SCBT FINANCIAL CORP	2388737	USA	1.37
HHS	HARTE HANKS INC	2410812	USA	1.35
CAC	CAMDEN NATIONAL CORP	2116659	USA	1.35
GPK	GRAPHIC PACKAGING HOLDING CO	B2Q8249	USA	1.35
SASR	SANDY SPRING BANCORP INC	2148254	USA	1.35
FLWS	1-800-FLOWERS.COM	2444123	USA	1.33
UVV	UNIVERSAL CORP/VA	2923804	USA	1.30

BEST SELL IDEAS

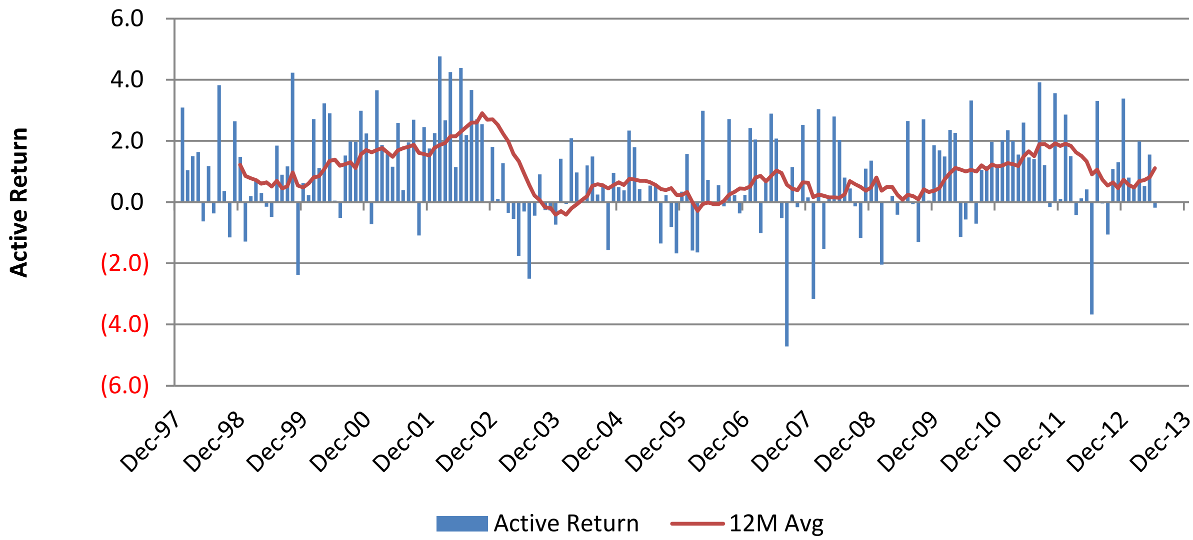
Ticker	Name	SEDOL	County	N-LASR Score (lower is better short)
ACHN	ACHILLION PHARMACEUTICALS	B17T9T8	USA	-2.01
VCRA	VOCERA COMMUNICATIONS INC	B76LYJ2	USA	-1.82
HNSN	HANSEN MEDICAL INC	B1HLJ49	USA	-1.82
NEON	NEONODE INC	B1VVZR0	USA	-1.82
KYTH	KYTHERA BIOPHARMA INC	B75H4Z7	USA	-1.80
EOPN	E2OPEN INC	B8BZB40	USA	-1.80
SCSS	SELECT COMFORT CORP	2320892	USA	-1.78
AWRE	AWARE INC	2067092	USA	-1.77
AVEO	AVEO PHARMACEUTICALS INC	B52G992	USA	-1.76
KEYN	KEYNOTE SYSTEMS INC	2492177	USA	-1.71
OMER	OMEROS CORP	B4NB858	USA	-1.69
OCLR	OCLARO INC	B01W5C1	USA	-1.68
EOX	EMERALD OIL INC	B8Q67F1	USA	-1.67
TISI	TEAM INC	2879123	USA	-1.66
SQNM	SEQUENOM INC	B16CJ10	USA	-1.66
ZGNX	ZOGENIX INC	B5BTKW2	USA	-1.65
AMSC	AMERICAN SUPERCONDUCTOR CP	2032722	USA	-1.65
ENVI	ENVIVIO INC	B3Q5FF9	USA	-1.60
VVUS	VIVUS INC	2934657	USA	-1.58
DXCM	DEXCOM INC	B0796X4	USA	-1.58

Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Small cap model performance

The N-LASR model has performed well since inception. Figure 25 shows the average pure signal performance, measured as a monthly rank information coefficient (IC).

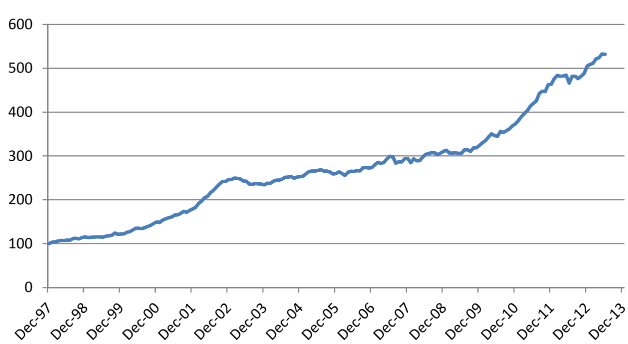
Figure 25: Model portfolio active return, after costs



Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

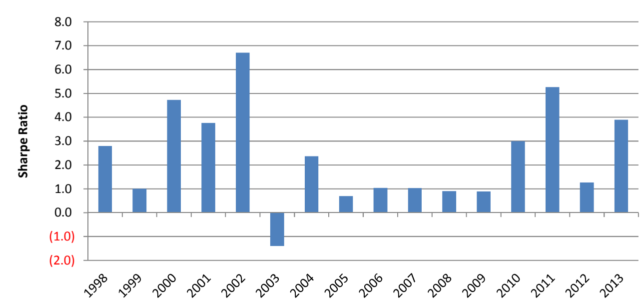
Figure 26 shows the cumulative performance of the optimized strategy, and Figure 27 shows the annualized Sharpe ratio (after costs) by calendar year.

Figure 26: Portfolio cumulative, after costs



Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 27: Annualized Sharpe ratio, after costs



Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Appendix 1

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