



Quantitative Strategy
**The Quant View:
Small Cap Edition**

Date
3 May 2013

Updating our best quant ideas for small caps

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.

Small caps, big opportunity

Quantitative screening techniques are particularly fruitful in the small caps world. With so many stocks to choose from, and so little time to analyze them all, quant tools can help point small cap investors towards the types of stocks that warrant further analysis. In this report we introduce a quant toolbox that we think will make a small cap manager's job easier.

Introducing two unique small cap stock-selection models

We highlight two quantitative screening models that are particularly effective in the small cap space. The first model – our QCD model – uses dynamic factor rotation to better tilt towards the styles that are being rewarded by investors in the small cap space. The second model – our N-LASR model – uses cutting-edge machine learning techniques to adapt to rapidly changing market conditions. We present our top small cap calls from both models.

What works in small caps?

We also introduce our DB Small Cap Dashboard, a useful tool for tracking which themes are driving investors' thinking in the small cap space. Currently momentum is the strongest performing factor, while yield has also been popular (no surprises there).

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A letter to our readers

A one-stop shop for all our small cap quant models

During the past three years we have written a lot of research – over 80 reports, not including model updates – and as a result keeping track of all our models has become a challenge.¹ To simplify things, we are launching a new report: “The Quant View: Small Cap Edition”. In this report, we will present the latest forecasts from seven key models:

- **Variance Risk Premium** – The VRP is a top-down signal that we use extensively in our research to forecast upcoming risk regimes. A high reading of VRP indicates we should be buying risky assets like equities, high yield, etc.
- **Opportunity Set** – The Opportunity Set (OS) is a metric that allows investors to decompose alpha into its various underlying drivers. The OS allows investors to gauge whether alpha opportunities for small cap stocks are dominated by stock selection, style timing, or sector calls.
- **Valuation Spreads** – Similar to the opportunity set, valuation spreads allow investors to gauge the level of stock selection opportunity in the overall market. Widening/narrowing valuation spreads are indicative of the level of stock differentiation for small cap stocks.
- **Stock Correlations** – Closely related to the opportunity set and valuation spreads is the pairwise correlation among stocks. The median pairwise correlation among stocks is yet another metric telling of the level of stock selection opportunity.
- **Small Cap Dashboard (Factor Performance)** – We show US small cap factor performance for various styles including: valuation, momentum, quality, sentiment, reversal, growth, and technicals.
- **QCD model** – Our flagship stock selection model for U.S. equities. This model uses a blend of factors to forecast month-ahead performance for small cap stocks.
- **N-LASR model** – Our flagship global stock selection model. The model uses a novel machine learning algorithm to dynamically adapt to changing market conditions. We use it to forecast month-ahead performance for global stocks.

On the following pages investors can find a succinct summary of the current recommendations from each model. Each model also has a much more detailed white paper – see the reference in each section.

Regards,

Yin, Rocky, Miguel, Javed, John, and Sheng
Deutsche Bank Quantitative Strategy

¹ For a complete library of all our past research, see the DB Quant Website at <https://eqindex.db.com/gqs/>. If you do not have a login, please contact us at DBEQS.Americas@db.com and we can get you set up.

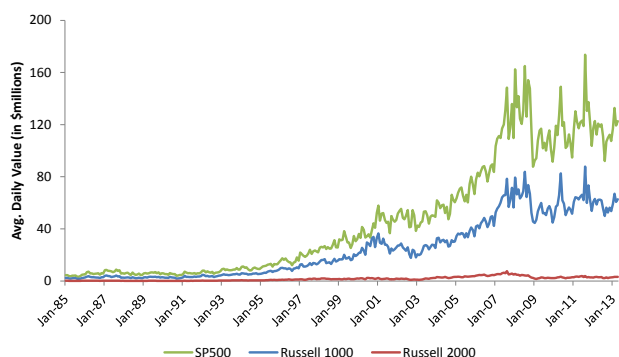


Quantifying markets

Shying away from small caps?

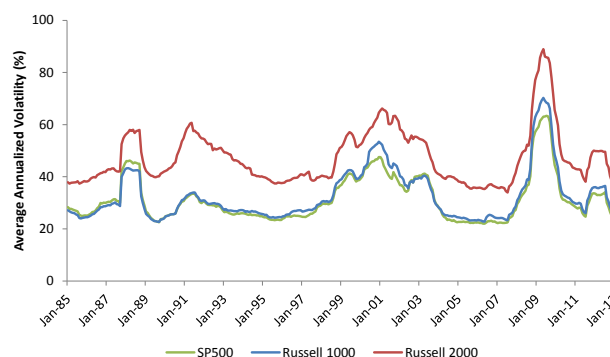
In the wake of the subprime crisis and European debt crisis, risk aversion skyrocketed. In such a risk-off environment, investors could hardly be blamed for shying away from the illiquidity and higher volatility inherent in small cap stocks. For example, Figure 1 shows the time series median Average Daily Value (ADV) for the constituents of the major market indices. As shown and as expected, on average smaller cap stocks (e.g. the Russell 2000) have significantly lower levels of liquidity when compared to larger cap stocks (e.g., Russell 1000, S&P 500). Similarly, Figure 2 shows the median annualized volatility for the constituents of the major market indices. Again as expected, on average smaller cap stocks are significantly more volatile than large cap stocks. However, not all hope is lost. Opportunities tend to arise where others fear to tread.

Figure 1: Median ADV for various universes



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

Figure 2: Median annualized vol for various universes



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

Small caps, big opportunity

In our inaugural launch of "The Quant View: Small Cap Edition" we aim to show that small cap stocks offer greater opportunity for stock selection. 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.

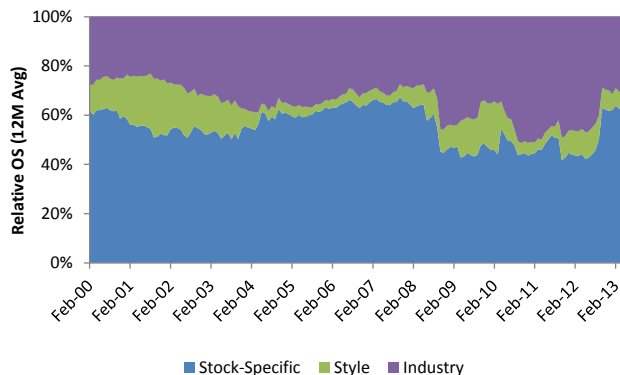
For this report, we will use the Russell 2000 index to define our small caps universe. Where we compare to large caps, we will use the Russell 1000 as our proxy.

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 3 we show the opportunity set for the large cap universe, and in Figure 4 we show the opportunity set for the small cap universe.

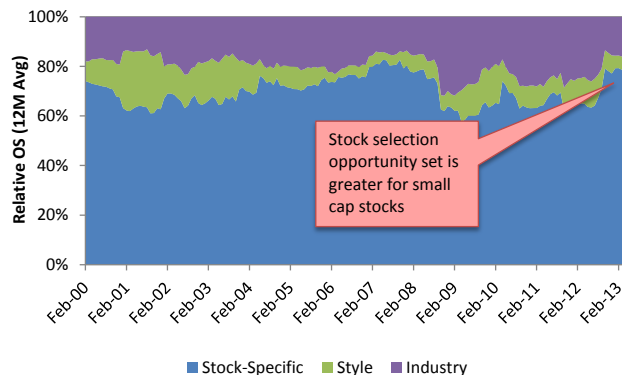


Figure 3: Large cap opportunity set



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

Figure 4: 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.

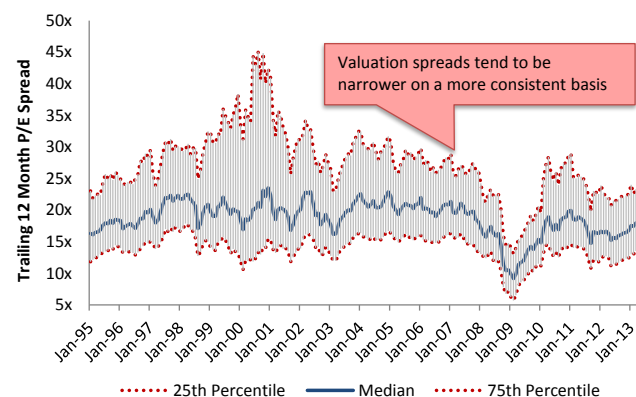
However, the good news is that both charts show that bottom-up stock picking is making a strong comeback. The blue area in both charts has reached levels last seen in 2007. The crucial observation is that the relative opportunity coming from stock selection is higher for small cap stocks. In other words,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

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 5 and Figure 6 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.

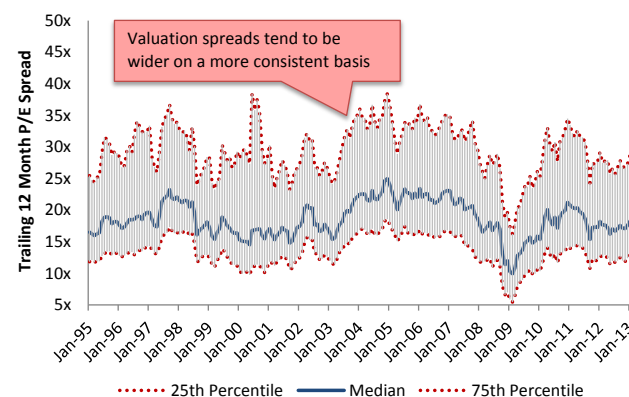


Figure 5: Large cap valuation spreads



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

Figure 6: Small caps valuation spreads

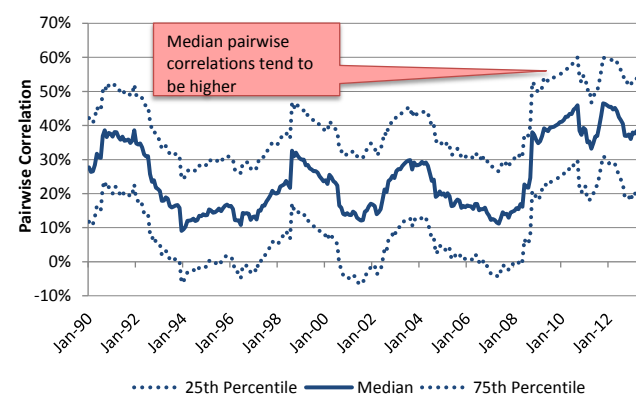


Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Keeping an eye on correlations

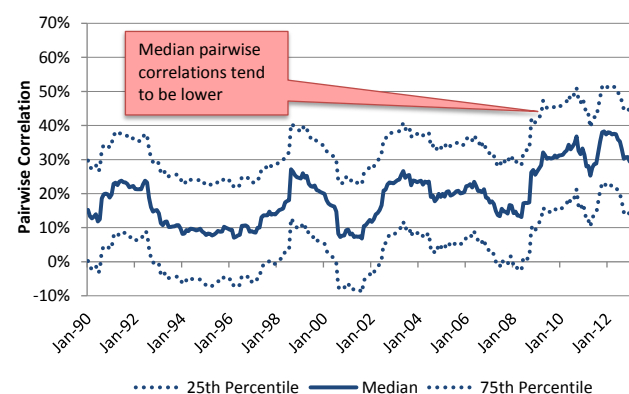
Closely related to the opportunity set and valuation spreads is the median pairwise correlation among stocks in the market. This is calculated by taking every possible pair of stocks, and computing the correlation of their monthly returns based on the past 24 months of data, and then taking the median across all the pairs. Figure 7 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 8) 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.

Figure 7: Median pairwise correlation for large caps



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

Figure 8: 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?

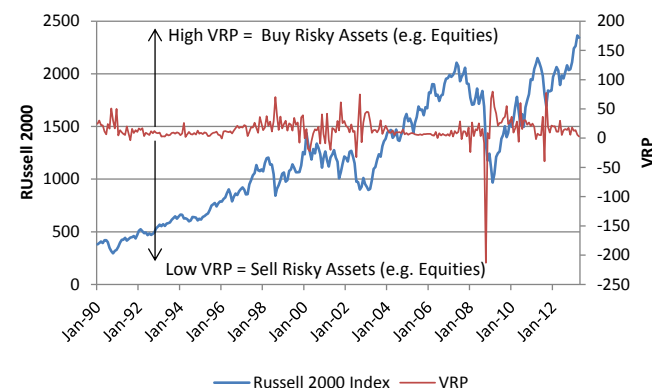


Our favorite market timing indicator

Our Variance Risk Premium (VRP) indicator is a contrarian indicator that measures market overreaction and underreaction to realized risk. 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.

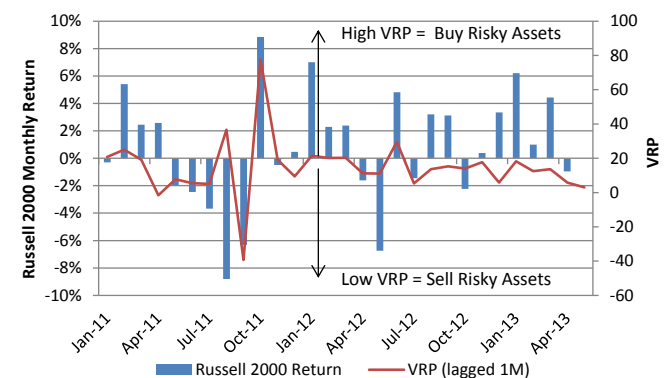
So where do we sit today? Today our VRP indicator continues to have a bearish flavor, albeit not particularly strong by historical standards. The current reading is around half a standard deviation below the long-term average, whereas a strong signal would be a reading of around two standard deviations. Nonetheless, as the market continues to rally this does indicate that a little complacency is creeping in, in the sense that the risk investors are pricing in is starting to lag the actual realized risk in the market. We'll continue to watch this closely, because we do think it will be a useful tool for gauging when the current rally is coming to an end.

Figure 9: Variance Risk Premium (VRP)



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

Figure 10: Recent VRP (lagged) and market returns



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

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.



The Small Cap Dashboard

Which styles have been working in small caps?

This month we introduce 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 11 shows the results for small caps, and for comparison Figure 12 shows the same chart for large caps.

A few important themes emerge from the dashboard this month.

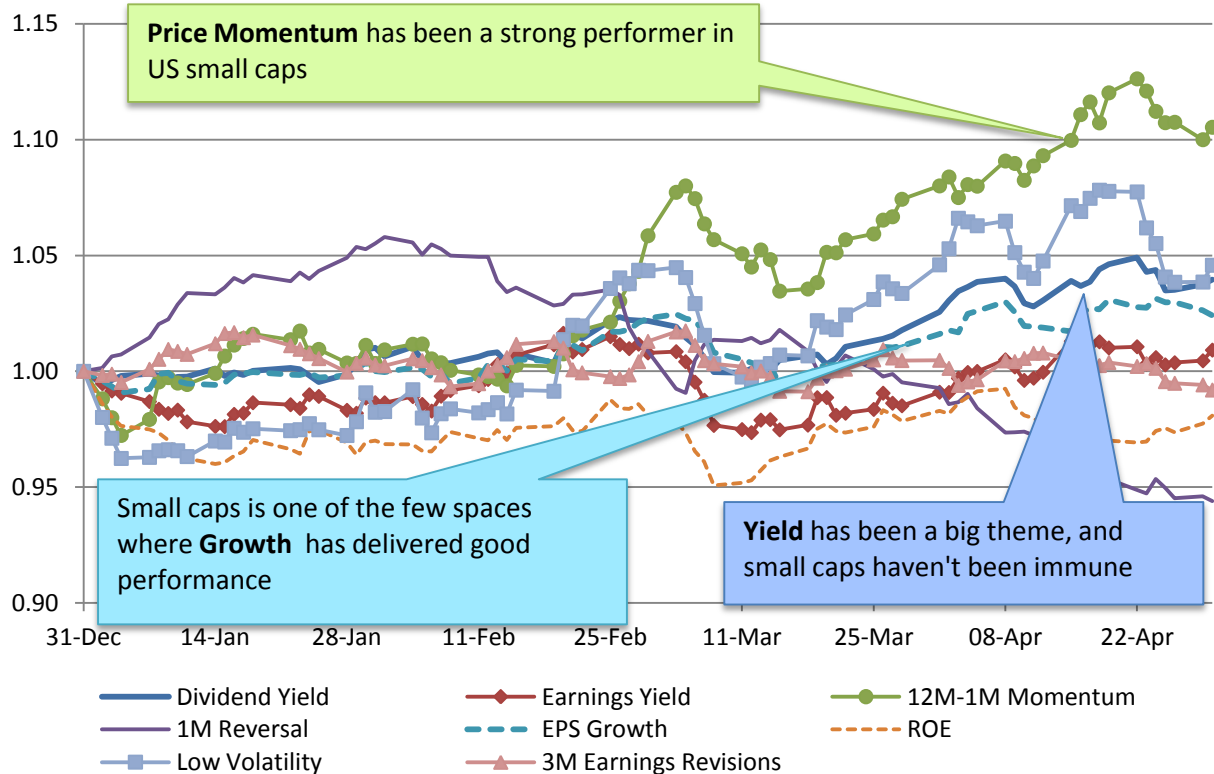
- This rally has been somewhat unique in that it has been driven by lower beta, lower volatility, higher yield names. Even in the small caps world this has been true. Dividend Yield and Low Volatility have been two of the best performing styles this year.
- However, the best factor of all has been 12M Price Momentum. On face value, this may seem strange; however if we look more closely at the composition of price momentum right now, we see it is closely aligned with beta. In other words, the defensive rally has been going on so long now that it is the low beta names that have the best momentum. So momentum is really just another proxy for the long defensives/short cyclical trade.
- Earnings Growth is not usually a strong factor, because on average the market tends to overpay for future growth that more often than not fails to materialize. However, in small caps land this strategy tends to work better; after all this is why many investors seek out small caps in the first place.

[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.

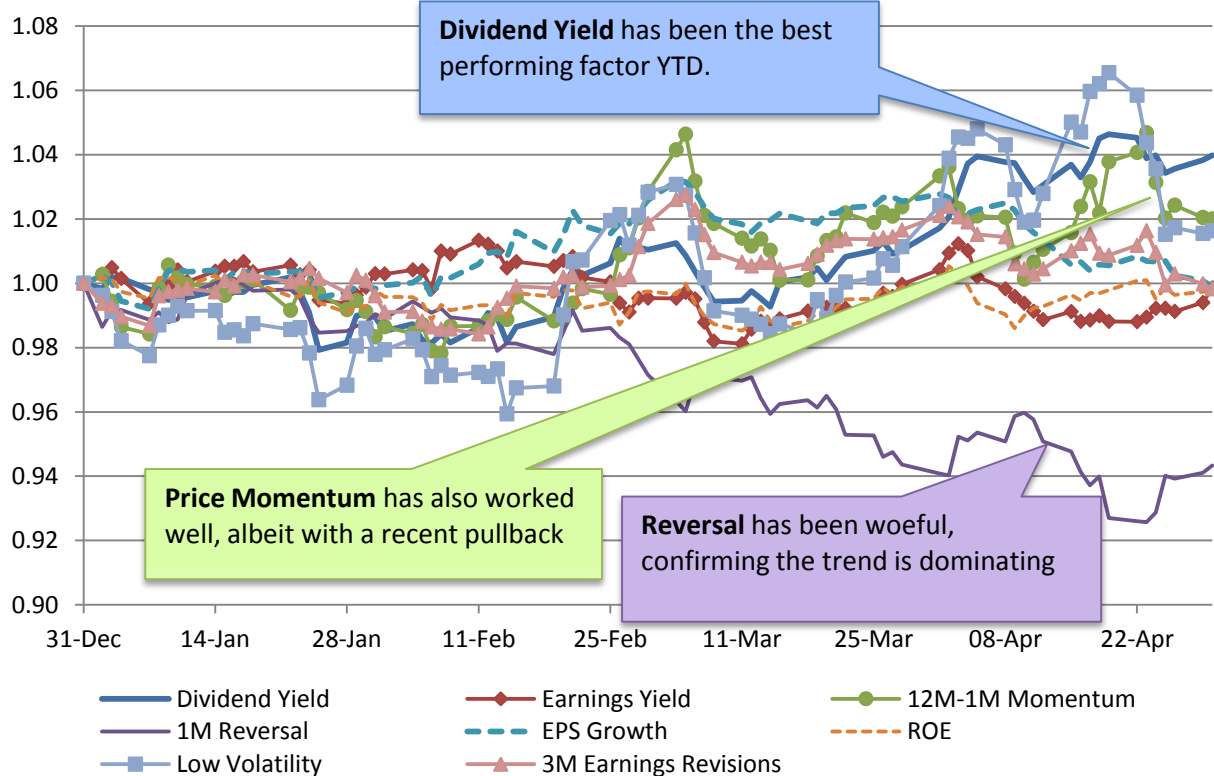


Figure 11: Small Caps (Russell 2000): YTD cumulative factor performance (Q10-Q1 return spread)



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

Figure 12: Large Caps (Russell 1000): Latest month 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 13 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 13: Current QCD model stock recommendations fro Russell 2000 universe

BEST BUY IDEAS (SECTOR NEUTRAL)					BEST SELL IDEAS (SECTOR NEUTRAL)				
Ticker	Name	CUSIP	GICS Sector	QCD Score (higher is better long)	Ticker	Name	CUSIP	GICS Sector	QCD Score (lower is better short)
MN	MANNING & NAPIER INC	56382Q102	Financials	17.8%	HNR	HARVEST NATURAL RESOURCES	41754V103	Energy	-35.8%
ARB	ARBITRON INC	03875Q108	Consumer Discretionary	15.3%	KIOR	KIOR INC	497217109	Energy	-33.5%
LGF	LIONS GATE ENTERTAINMENT CP	535919203	Consumer Discretionary	15.2%	GTAT	GT ADVANCED TECHNOLOGIES INC	36191U106	Information Technology	-30.3%
CSH	CASH AMERICA INTL INC	14754D100	Financials	15.0%	AUMN	GOLDEN MINERALS CO	381119106	Materials	-30.1%
PRXL	PAREXEL INTERNATIONAL CORP	699462107	Health Care	13.4%	RBCN	RUBICON TECHNOLOGY INC	78112T107	Information Technology	-30.1%
SAFM	SANDERSON FARMS INC	800013104	Consumer Staples	12.8%	GMO	GENERAL MOLY INC	370373102	Materials	-28.2%
AOI	ALLIANCE ONE INTL INC	018772103	Consumer Staples	12.1%	ACFN	ACORN ENERGY INC	004848107	Industrials	-25.4%
TMH	TEAM HEALTH HOLDINGS INC	87817A107	Health Care	11.9%	SWSH	SWISHER HYGIENE INC	870808102	Industrials	-23.9%
RRTS	ROADRUNNER TRANS SVCS HLDGS	76973Q105	Industrials	8.5%	ZIOP	ZIOPHARM ONCOLOGY INC	98973P101	Health Care	-23.5%
TTEC	TELETECH HOLDINGS INC	879939106	Information Technology	7.7%	ETRM	ENTEROMEDICS INC	29365M208	Health Care	-21.9%
SAIA	SAIA INC	78709Y105	Industrials	7.4%	IQNT	NEUTRAL TANDEM INC	64128B108	Telecommunication Services	-20.2%
MANH	MANHATTAN ASSOCIATES INC	562750109	Information Technology	6.8%	MTG	MGIC INVESTMENT CORP/WI	552848103	Financials	-20.1%
OTTR	OTTER TAIL CORP	689648103	Utilities	5.7%	TWER	TOWERSTREAM CORP	892000100	Telecommunication Services	-19.7%
WNR	WESTERN REFINING INC	959319104	Energy	5.5%	STSI	STAR SCIENTIFIC INC	85517P101	Consumer Staples	-19.2%
DK	DELEK US HOLDINGS INC	246647101	Energy	5.4%	CACB	CASCADE BANCORP	147154207	Financials	-18.5%
HCOM	HAWAIIAN TELCOM HOLDCO INC	420031106	Telecommunication Services	4.4%	CDZI	CADIZ INC	127537207	Utilities	-15.9%
LG	LACLEDE GROUP INC	505597104	Utilities	3.2%	FSYS	FUEL SYSTEMS SOLUTIONS INC	35952W103	Consumer Discretionary	-15.6%
FTK	FLOTEK INDUSTRIES INC	343389102	Materials	2.7%	FDML	FEDERAL-MOGUL CORP	313549404	Consumer Discretionary	-15.2%
IDT	IDT CORP	448947507	Telecommunication Services	2.6%	AT	ATLANTIC POWER CORP	04878Q863	Utilities	-14.8%
WOR	WORTHINGTON INDUSTRIES	981811102	Materials	1.8%	CQB	CHIQUITA BRANDS INTL INC	170032809	Consumer Staples	-12.8%

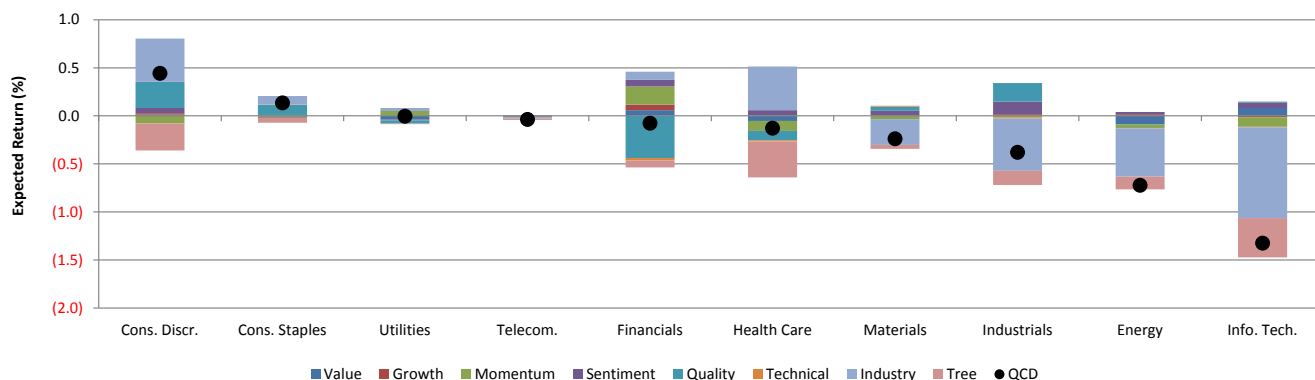
Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Current sector recommendations

The QCD model also implicitly makes sector predictions. Figure 14 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 14: Current QCD sector recommendations for Russell 2000 universe

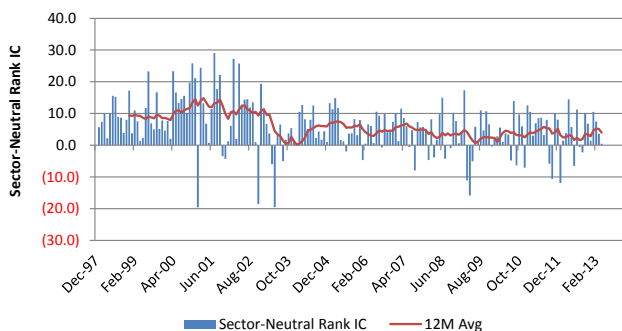


Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Small cap model performance

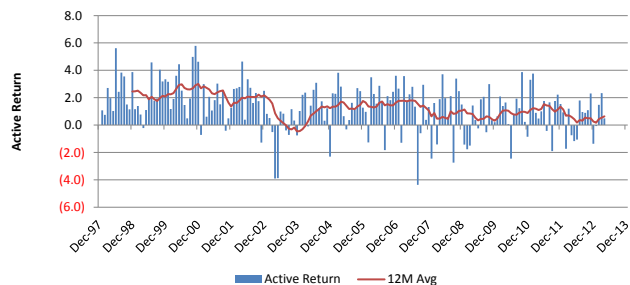
The QCD model has performed well since inception. Figure 15 shows the pure signal performance, measured as a monthly sector-neutral rank information coefficient (IC). Figure 16 shows the performance of an actual model portfolio, after costs, based on a realistically optimized market-neutral strategy.

Figure 15: Model performance, sector-neutral rank IC



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

Figure 16: Model portfolio active return, after costs

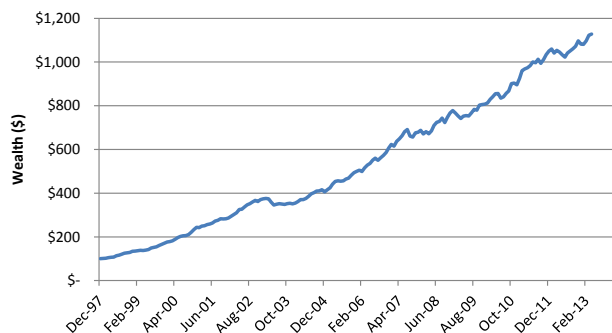


Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Figure 17 shows the cumulative performance of the optimized strategy, and Figure 18 shows the annualized Sharpe ratio (after costs) by calendar year.

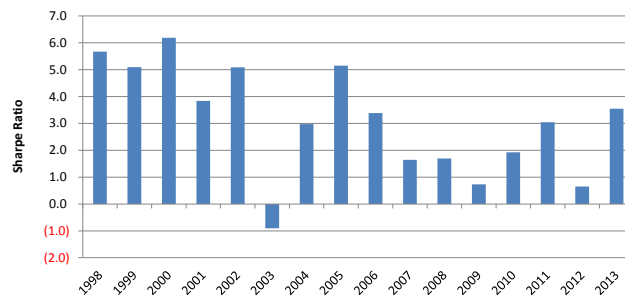


Figure 17: Model portfolio cumulative, after costs



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

Figure 18: 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 19 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 19: Current N-LASR model stock recommendations for Russell 2000 universe

BEST BUY IDEAS					BEST SELL IDEAS				
Ticker	Name	SEDOL	Country	N-LASR Score (higher is better long)	Ticker	Name	SEDOL	Country	N-LASR Score (lower is better short)
SLRC	SOLAR CAPITAL LTD	B61FRC6	USA	2.39	UIIP	UNWIRED PLANET INC	B7KNF13	USA	-1.99
PDLI	PDL BIOPHARMA INC	2706704	USA	2.24	VSTM	VERASTEM INC	B4Z1Y92	USA	-1.92
SNX	SYNNEX CORP	2002554	USA	2.08	SNHY	SUN HYDRAULICS CORP	2819282	USA	-1.85
ARR	ARMOUR RESIDENTIAL REIT INC	B59YH21	USA	2.05	GPOR	GULFPORT ENERGY CORP	2398684	USA	-1.84
ACRE	ARES COMMERCIAL REAL ESTATE	B77PWP5	USA	2.03	CACB	CASCADE BANCORP	2184236	USA	-1.82
FSC	FIFTH STREET FINANCE CORP	B39W7B7	USA	1.92	SBCF	SEACOAST BANKING CORP/FL	2793621	USA	-1.81
FAF	FIRST AMERICAN FINANCIAL CP	B4NFPK4	USA	1.89	IDTI	INTEGRATED DEVICE TECH INC	2462437	USA	-1.79
EXL	EXCEL TRUST INC	B563VF9	USA	1.88	COHR	COHERENT INC	2208374	USA	-1.76
TICC	TICC CAPITAL CORP	2182478	USA	1.80	ALCO	ALICO INC	2016425	USA	-1.76
UIL	UIL HOLDINGS CORP	2613785	USA	1.79	FALC	FALCONSTOR SOFTWARE INC	2629759	USA	-1.72
IDA	IDACORP INC	2296937	USA	1.77	WINA	WINMARK CORP	2391092	USA	-1.68
MTGE	AMERICAN CAPITAL MTG INV CP	B6QB581	USA	1.77	GLPW	GLOBAL POWER EQUIPMENT GROU	B2PJYB4	USA	-1.66
FRF	FORTEGRA FINANCIAL CORP	B4VK051	USA	1.77	HIFS	HINGHAM INSTN FOR SAVINGS	2428439	USA	-1.62
UNS	UNS ENERGY CORP	B76S028	USA	1.76	SYRG	SYNERGY RESOURCES CORP	B296B18	USA	-1.62
GRT	GLIMCHER REALTY TRUST	2371696	USA	1.73	VIAS	VIASYSTEMS GROUP INC	B62FJ41	USA	-1.61
AINV	APOLLO INVESTMENT CORP	B00NWP7	USA	1.70	EXAC	EXACTECH INC	2306353	USA	-1.57
EPIQ	EPIQ SYSTEMS INC	2371339	USA	1.68	PEGA	PEGASYSTEMS INC	2675860	USA	-1.54
NMFC	NEW MOUNTAIN FINANCE CORP	B61WWF5	USA	1.64	UNIS	UNILIFE CORP	B61FS45	USA	-1.52
PNM	PNM RESOURCES INC	2707826	USA	1.64	LUFK	LUFKIN INDUSTRIES INC	2537487	USA	-1.51
POR	PORTLAND GENERAL ELECTRIC CO	B125XQ6	USA	1.63	HOS	HORNBECK OFFSHORE SVCS INC	B00G814	USA	-1.50

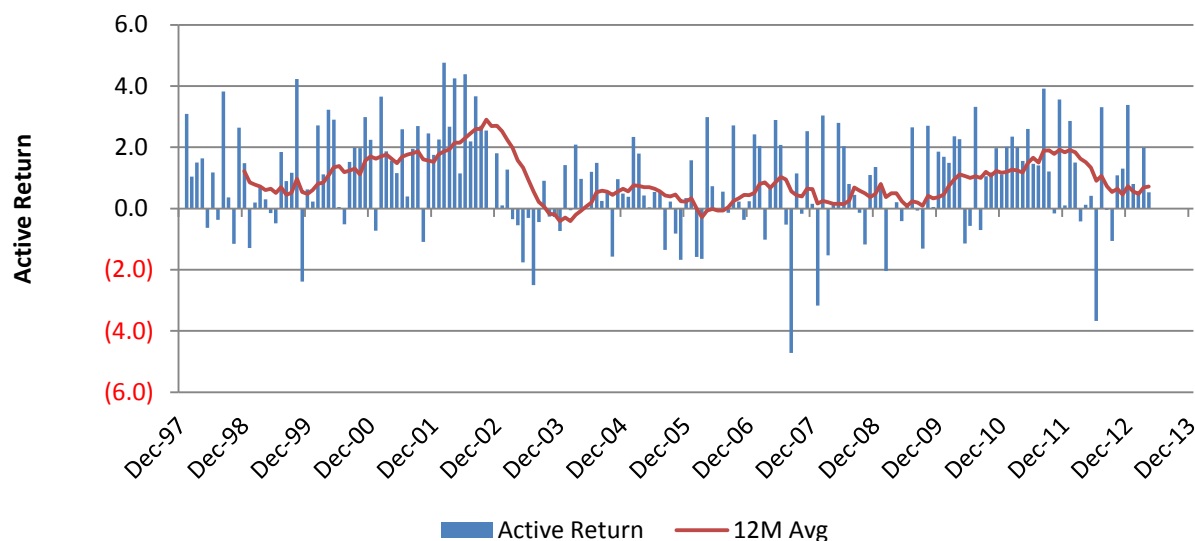
Source: Bloomberg Finance LP, Compustat, IBES, MSCI, Russell, S&P, Thomson Reuters, Worldscope, Deutsche Bank

Small cap model performance

The N-LASR model has performed well since inception. Figure 20 shows the average pure signal performance, measured as a monthly rank information coefficient (IC), in different regions.



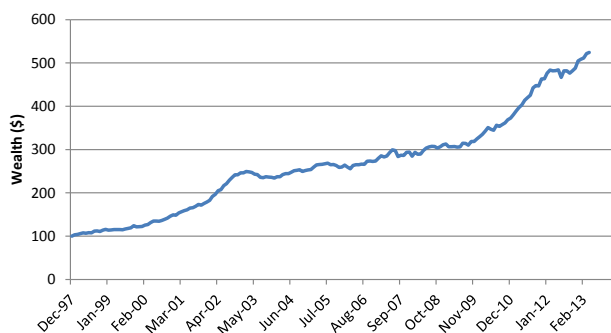
Figure 20: Model portfolio active return, after costs



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

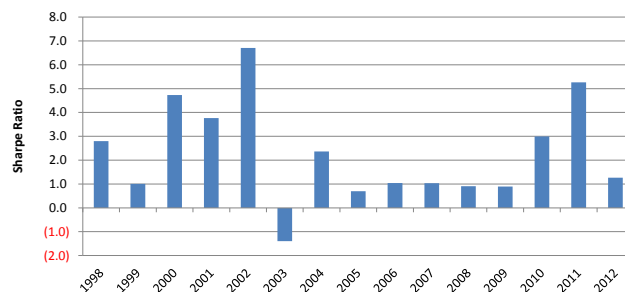
Figure 21 shows the cumulative performance of the optimized strategy, and Figure 22 shows the annualized Sharpe ratio (after costs) by calendar year.

Figure 21: Portfolio cumulative, after costs



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

Figure 22: 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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