Russell Investments

Russell Research

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Russell style index methodology update

Russell continually monitors, evaluates and, as needed, refines the Russell Indexes. Russell's methodology for constructing style indexes is well established as a useful way of representing investment styles: since their launch in 1987, Russell's U.S. growth and value style indexes have become widely used as benchmarks for active management and as the basis for passive investment vehicles.[2] In 2010, in addition to developing a stability dimension of style,[3] Russell reviewed its methodology for constructing growth and value style indexes and found opportunities for improvement in two areas: selection of growth input variables to the style algorithm, and development of a method for reducing turnover at reconstitution. Changes to the methodology will be implemented at the June 2011 reconstitution; this report provides details of Russell's research into growth and value style methodology, which led to those changes.

Current valuation style methodology

Russell's current methodology was implemented in 1995 for the U.S. and applied to the Russell Global Indexes in 2008. In this methodology, the stocks of an underlying index (the Russell 1000®, for example) are sorted based on scores derived from observed equity characteristics. A growth score is formed from standardized values of growth characteristics, while a value score is formed from standardized values of value characteristics. The growth score and the value score are combined to form a composite value score (CVS). Finally, a nonlinear probability algorithm is applied to the CVS, which

[1] Many Russell associates contributed to this work. I thank Bryson Hirai-Hadley for computational assistance and Rolf Agather, Bob Collie, Mary Fjelstad, Dave Hintz, Sarah McCarthy, Mahesh Pritamani and Mark Thurston for their insights.

[2] For evidence of how well the Russell U.S. style indexes represent U.S. equity style funds, see Blanchett (2010).

[3] See Hintz (2010).

assigns growth and value probabilities to each stock. The term *probability* indicates the degree of certainty that a stock is growth or value. This method allows a number of stocks to be represented as having both growth and value characteristics, while preserving the additive nature of the indexes.[4]

Since the launch of the Russell style indexes in 1987, the descriptive variable used to measure value has been the book-to-price (B/P) ratio. This variable is widely recognized as an equity valuation characteristic.[5] Recent research (Haughton and Pritamani 2005, Cariño 2008) has validated the robustness of this variable for constructing style indexes.

The variable used by Russell Indexes to measure growth has been the long-term growth (LTG) mean forecast compiled by I/B/E/S.[6] The LTG forecast is a publicly available consensus on the future growth prospects of a company. This statistic aggregates the views of widely followed security analysts and (arguably) also reflects average investor views. This variable has complemented the B/P ratio well, and the combination of the two variables has provided a good basis for distinguishing growth from value companies.

Catalyst for a change

Security analysts voluntarily contribute earnings estimates for one-, two- and three-year horizons and a long-term growth rate that covers horizons longer than three years. In recent years, the number of analysts reporting LTG forecasts to I/B/E/S has been declining. Table 1 shows the average number of analysts contributing estimates for the various horizons at reconstitution over the last five years.

Table 1 / Average number of analysts contributing long-term growth (LTG) forecasts and forecasted earnings for fiscal year 3 (FY3), fiscal year 2 (FY2) and fiscal year 1 (FY1) to I/B/E/S, as of 31 May for the years shown.

	U.S.				Global ex-U.S.			
Year	LTG	FY3	FY2	FY1	LTG	FY3	FY2	FY1
Large Cap								
2006	5.8	3.1	12.2	12.8	1.4	5.3	9.6	10.2
2007	4.9	3.5	12.5	12.5	1.5	6.1	10.6	11.1
2008	3.9	3.9	11.8	11.7	1.5	6.6	10.4	10.9
2009	3.5	4.1	12.4	12.3	1.3	6.9	11.1	11.5
2010	3.6	5.6	14.4	14.1	1.7	7.7	11.7	12.1
Small Cap								
2006	2.1	0.9	4.8	5.2	0.4	1.6	3.0	3.2
2007	2.0	1.1	5.2	5.4	0.5	1.8	3.2	3.4
2008	1.7	1.1	4.9	5.1	0.5	2.1	3.5	3.7
2009	1.4	1.0	4.7	4.8	0.4	2.1	3.5	3.7
2010	1.3	1.4	5.2	5.3	0.4	2.2	3.5	3.7

The average number of analysts contributing LTG forecasts for U.S. large cap firms has declined, from nearly six in 2006 to under four in 2010. Meanwhile, the number of three-year forecasts has been rising, while the number of analysts contributing one- and two-year

[4] For a full description of the algorithm, see "Russell U.S. Equity Indexes Construction and Methodology," March 2011, available at www.russell.com/indexes.

[5] See Haughton and Christopherson (1989); Fama and French (1992, 2007); Chan and Lakonishok (2004).

[6] The Institutional Brokers' Estimate System (I/B/E/S) collects earnings forecasts from security analysts and publishes various consensus forecasts as well as individual analyst estimates. The database is currently owned by Thomson Reuters. See http://thomsonreuters.com/products_services/financial/financial_products/a-z/ibes/.

forecasts has remained steady, averaging around 12 over this time period. Large cap U.S. firms have the greatest coverage. The coverage of U.S. small cap firms shown in Table 1 is lower than that of U.S. large cap firms, with a similar decline in analysts contributing LTG forecasts. For global ex-U.S. large cap firms, the number of analysts contributing LTG forecasts has been comparable to the number of analysts doing so for U.S. small cap firms. The numbers of one- and two-year estimates are much greater than the number of LTG forecasts in both large and small cap ex-U.S. firms, approaching those of U.S. firms.

Why has the number of analysts contributing LTG forecasts declined? Some researchers suggest that the issuance of LTG forecasts is positively related to investors' demand for the forecasts and negatively related to the costs of collecting the information needed to make them (Jung, Shane and Yang 2008). It is possible that long-term growth prospects became increasingly difficult to forecast as the recent recession came into view.

Whatever the reasons, the downward trend in LTG forecast availability is observable, and Russell deemed it time to take another look at alternative input variables for the growth/value style methodology.

Overview of the methodology changes

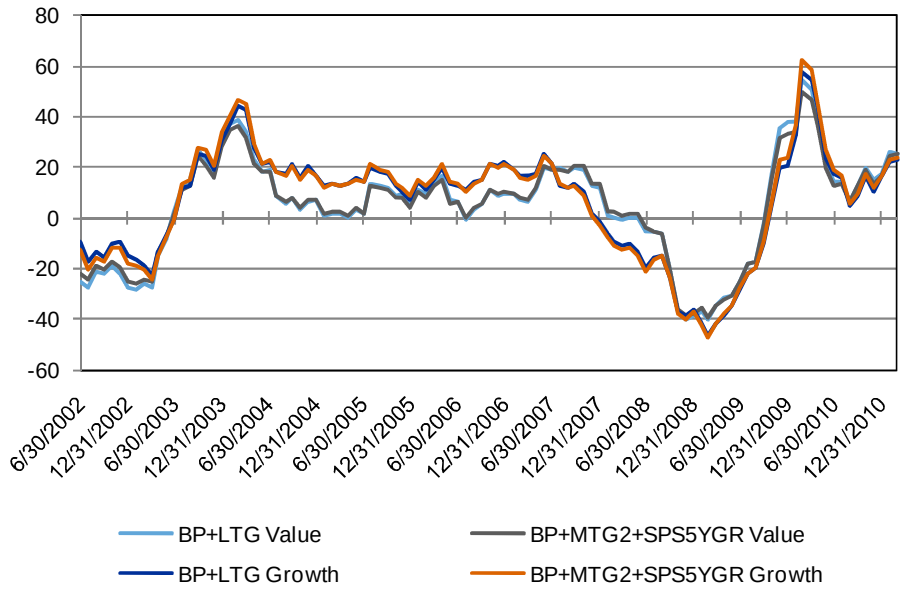
Russell's reexamination of the style methodology demonstrated that the current approach—the combination of the B/P ratio as the value indicator and LTG as the growth indicator—has been and continues to be the best model for creating growth and value style indexes. As B/P is a readily available statistic, Russell has made no change to its use as the variable to identify the value characteristic of a stock. The declining availability of LTG forecasts, described above, determined the need to find alternative indicators for growth.

Thus the methodology to be implemented at the June 2011 reconstitution contains the following key changes:

- The LTG variable will be dropped and replaced with the combination of two variables: a medium-term growth rate forecast based on I/B/E/S two-year forecasts, and a sales-per-share growth rate based on five-year historical sales.
- A method for reducing turnover of the style indexes at recon will be implemented, based on banding the change in CVS. We discuss CVS banding below under "Turnover reduction."

Indexes constructed from the new combination of input variables should perform similarly to the existing indexes in historical simulations. Figure 1 plots rolling 12-month returns of indexes using the current and the new combinations of variables for Russell 3000® constituents. The graph shows that style indexes based on the new combination of variables perform very similarly to the existing indexes.

Figure 1 / Rolling 12-month returns of growth and value style indexes based on the Russell 3000® constructed with the variables B/P + LTG and with B/P + MTG2 + SPS5YGR



In the remainder of this report, we describe the evidence supporting these changes in methodology.

Research approach

To explore alternatives to the existing methodology, we took an approach similar to that described in Cariño (2008):

- Compute candidate indexes based on alternative combinations of input variables and possible algorithm changes.
- Compare the index holdings against average portfolio holdings of manager universes of various styles.
- Compute the turnover at reconstitution that would have occurred if the candidate methodology had been in place historically.

Our goal was to find a suitable combination of variables that would produce indexes that best represented style portfolios held by investment managers. We also sought to achieve no greater turnover than that of the current indexes.

The large number of possible combinations of variables made it impracticable to test them all. Undaunted, we simulated several hundred candidate combinations of variables and methodologies. We narrowed the list of alternative combinations by balancing data availability, intuitiveness, simplicity, representativeness and turnover.

We first computed style indexes based on individual variables. The single-variable indexes provided information by which to narrow the list of variables to a more manageable number. If a single variable produced indexes that were far different from the existing indexes, it was unlikely that including that variable in combination with others would improve the

representativeness of the indexes. We discarded the least representative variables and those with least data availability.

After narrowing the list, we computed style indexes that use combinations of variables. We computed measures of representativeness against manager universe holdings and turnover at simulated historical reconstitutions. We arrived at the final combination after balancing representativeness and turnover.

We explored further approaches to reducing turnover of the style indexes at reconstitution. We developed a method that reduces turnover by eliminating small changes in CVS while allowing larger, more meaningful changes to occur at reconstitution.

Data

We used the Russell Global Index constituents from 2001 to 2010 for this study. Consistent with the rules that existed historically, we ran the style methodology separately on segments of the Russell Global Index as follows:

- From 2001 to 2008, the style algorithm was run on U.S. large cap, U.S. small cap, Japan large cap, Japan small cap, Global ex-U.S. ex-Japan large cap, and Global ex-U.S. ex-Japan small cap.
- From 2009 to 2010, the style algorithm was run on U.S. large cap, U.S. small cap, Global ex-U.S. large cap, and Global ex-U.S. small cap.

We compared the candidate indexes against several manager style universes.[7] We used the key growth and value universes in this study, listed in Table 2. Descriptions of these manager universes are in the appendix.

Table 2 / Number of portfolios in Russell's manager universes by style as of 30 June of each year

Manager Universe	2003	2004	2005	2006	2007	2008	2009	2010
Global Large Cap Value Equity	0	0	25	30	44	58	58	53
Global Large Cap Growth Equity	0	0	24	34	40	43	51	58
Global ex-U.S. Large Cap Value Equity	30	31	41	43	49	63	56	62
Global ex-U.S. Large Cap Growth Equity	33	29	43	51	54	54	52	54
U.S. Large Cap Value Equity	100	113	110	115	125	126	115	110
U.S. Large Cap Growth Equity	75	104	101	113	130	142	135	132
U.S. Small Cap Value Equity	101	108	101	116	137	148	128	129
U.S. Small Cap Growth Equity	100	105	106	108	132	140	139	129

By comparing the candidate indexes with actual managed portfolios, we measure how well an index represents the manager style. Further, by simulating indexes historically, we strive for continuity in the properties of the indexes between the current methodology and the proposed changes.

[7] Manager universes are collections of representative investment products identified by Russell manager research as peer groups for comparing investment managers. Based on an extensive process of discovery and evaluation, Russell manager analysts use both qualitative and quantitative criteria in determining the style of an investment product and assigning it to a peer group, also known as a manager universe.

Growth and value characteristics

We considered a number of alternative variables. The candidate descriptive variables and their acronyms are listed in Table 3.

Table 3 / Candidate style characteristics considered

Variable	Acronym
Value characteristics	
Book to price ratio	B/P
Cash flow to price ratio	CFP
Free cash flow to price ratio	FCFP
Earnings to price ratio	EP
Forecast earnings to price ratio, I/B/E/S mean	EPFC
Sales to price ratio	SP
Growth characteristics	
Long term growth forecast	LTG
Medium term growth forecast – 3 year forecast earnings divided by actual earnings	MTG3
Medium term growth forecast – 2 year forecast earnings divided by actual earnings	MTG2
Short term growth forecast – 1 year forecast earnings divided by actual earnings	STG
Sustainable growth – return on equity times one minus the payout ratio	SUSTGR
Earnings per share growth – 3-year trailing	EPS3YGR
Earnings per share growth – 5-year trailing	EPS5YGR
Sales growth – 3-year trailing	SALES3YGR
Sales growth – 5-year trailing	SALES5YGR
Sales per share growth – 3-year trailing	SPS3YGR
Sales per share growth – 5-year trailing	SPS5YGR
Sales to assets ratio growth – 3-year trailing	SA3YGR
Sales to assets ratio growth – 5-year trailing	SA5YGR
Price momentum – trailing 11-month return lagged by one month	PMOM

The growth forecast variables are based on forecasts from I/B/E/S. The LTG variable is the mean of the analyst forecasts of a long-term growth rate. The STG, MTG2 and MTG3 variables are derived from one-, two- and three-year earnings forecasts, respectively (referred to as FY1, FY2 and FY3 by I/B/E/S). An earnings forecast is converted to a growth ratio by dividing by the last reported annual earnings (FY0).[8]

The current methodology uses the mean of the analyst LTG forecasts. For the alternative STG, MTG2 and MTG3 growth forecasts, we used the median of the analyst earnings forecasts (divided by FY0 earnings), which is less sensitive to outliers among the analyst forecasts than is the mean.

The historical growth variables are based on earnings or sales per share. We tried variations of similar characteristics, including total sales, sales per share and the sales to assets ratio. Total sales (not per share) growth may be misleading in cases where one firm acquires another firm. We tried another ratio, sales to total assets, as a way to control for such acquired growth. However, sales per share gave better results than other methods to control for this effect.

[8] A growth rate can be obtained by subtracting 1 from the ratio FY1/FY0. Subtracting the constant has no effect on the style algorithm. If the value for FY0 is zero or negative, we consider the growth ratio to be not available.

Measure of representativeness

We compared the holdings of the candidate indexes to the average holdings of accounts in the manager universes, in order to gauge the representativeness of the indexes. We computed the average manager holdings in the following way. For each portfolio in a universe, we computed the weights at the end of June for each year. Then we computed the equal-weighted average of all portfolios in a given universe as of each date.

For each candidate index, given its holdings and the average manager portfolio holdings, we computed a measure of fit between the index and the manager universe as follows: We calculated the absolute value of the difference between the average manager weight and the candidate index weight for each stock, and summed over all the names in either the index or the manager portfolio. With weights ranging from zero to 100, this measure ranges from zero (identical portfolios) to 200 (no overlap in the portfolio holdings). Effectively, this measure is the round-trip percentage that would have to be sold and bought to transform one portfolio into the other.

This measure, which we call *absolute deviation*, provides a measure of the difference between portfolios at a single point in time. A smaller number represents a smaller difference than a larger number. In principle, weight differences translate into tracking error over time, and therefore absolute deviation is a convenient proxy for tracking error. After computing the absolute deviation at each reconstitution date, we next averaged the absolute deviation over the available dates shown in Table 2. The final number provides a measure of how well the candidate index represents the style universe over all of the available history.

Results for index candidates

We first computed indexes based on single input variables. Results for single-variable indexes are shown in Table 4.

Table 4 / Measures of fit for single-variable indexes. Absolute deviations from average style universe portfolios at reconstitution are averaged from 2003 to 2010. Global large cap measures are averaged from 2005 to 2010. A smaller number indicates a closer fit. Results are rounded to whole numbers. Highlighted cells are the lowest entries in each column.

Variables		U.S. Large Cap		U.S. Small Cap		Global Large Cap		Global ex-U.S. Large Cap	
Value	Growth	Value	Growth	Value	Growth	Value	Growth	Value	Growth
B/P		79	84	116	121	115	113	107	114
CFP		79	84	116	127	116	110	109	113
FCFP		93	108	122	138	117	124	112	123
EP		84	91	120	130	114	114	108	118
EPFC		94	107	124	138	113	122	109	122
SP		86	97	114	134	115	117	105	120
	LTG	85	78	117	116	113	114	105	122
	MTG3	91	91	127	130	113	117	106	122
	MTG2	93	91	126	127	114	117	108	123
	STG	97	94	128	128	116	119	109	123
	SUSTGR	98	93	138	131	121	120	112	121
	EPS3YGR	101	101	130	132	118	121	108	123
	EPS5YGR	99	98	130	132	116	121	107	124
	SALES3YGR	98	100	123	128	114	125	106	131
	SALES5YGR	100	106	123	129	114	128	107	133
	SPS3YGR	97	95	128	131	116	122	110	129
	SPS5YGR	96	97	127	132	115	125	108	130
	SA3YGR	109	115	133	144	123	131	117	132
	SA5YGR	111	116	133	144	121	132	114	134
	PMOM	105	106	130	134	120	122	113	123

Considering the value variable alternatives, the variable B/P gave the best fit to the U.S. value universes among all single-variable indexes. This is consistent with the results Russell found in earlier studies and with our current methodology. For the other value universes, the B/P single-variable index also fits nearly as well as any of the single variables tested. Given the near-universal availability of the B/P ratio and its effectiveness as a style variable, we left this variable in place as the value characteristic in the style algorithm. The results in Table 4 did not suggest that significant improvement would be gained from changing the value side of the inputs.

Turning to the growth side, the declining number of analysts forecasting LTG (see Table 1) compelled us to look for alternatives to this variable. Intuitively, the variables that might be most similar to LTG in terms of their definitions are MTG3 and MTG2. Both of these variables are based on analyst forecasts, with MTG3 conceivably a closer substitute for LTG, given its longer forecast horizon. The results in Table 4 show very little difference between the two variables when used in single-variable indexes. Given that two-year forecasts are available from more analysts than are three-year forecasts (see Table 1), we favored MTG2 a priori as a candidate variable over MTG3.

Combining the B/P ratio with a single growth measure

Results for indexes based on B/P and a single growth variable, shown in Table 5, confirm the intuition that MTG3 and MTG2 are closer substitutes for LTG than other variables. For nearly all universes, the current B/P + LTG combination gave the best fit. Substituting MTG3 or MTG2 for LTG always gave a better fit than substituting any other growth variable. The difference between the results for MTG3 and MTG2 are very small. In light of the better availability of two-year forecasts, the two-variable combination of B/P and MTG2 would appear to be a good choice.

Comparing the historical growth measures, earnings per share growth and sales per share growth, the results in Table 5 suggest that SPS3YGR or SPS5YGR offers a slightly better fit than does EPS3YGR or EPS5YGR. The other measures of sales growth, based on total sales or sales to assets ratio, did not fit as well as sales per share growth.

Table 5 / Measures of fit for two-variable indexes. Absolute deviations from average style universe portfolios at reconstitution are averaged from 2003 to 2010. Global large cap measures are averaged from 2005 to 2010. A smaller number indicates a closer fit. Results are rounded to whole numbers. Highlighted cells are the two lowest entries in each column.

Variables		U.S. Large Cap		U.S. Small Cap		Global Large Cap		Global ex-U.S. Large Cap	
Value	**Growth**	**Value**	**Growth**	**Value**	**Growth**	**Value**	**Growth**	**Value**	**Growth**
B/P	LTG	72	72	113	114	110	108	101	112
B/P	MTG3	77	79	116	119	110	108	101	110
B/P	MTG2	78	79	116	118	111	108	101	110
B/P	STG	81	81	118	119	112	110	102	112
B/P	SUSTGR	85	84	123	121	116	114	107	115
B/P	EPS3YGR	84	86	117	121	113	112	101	113
B/P	EPS5YGR	83	83	117	121	112	111	102	114
B/P	SPS3YGR	81	81	118	121	111	111	102	115
B/P	SPS5YGR	80	81	117	121	111	113	102	115
B/P	PMOM	86	85	118	122	113	112	104	112

Impact on index turnover

Forecasts over shorter forecast horizons might be more volatile than forecasts over longer forecast horizons. Replacing LTG with MTG2 could result in greater variability in the style probabilities, which ultimately would translate into greater turnover at reconstitution of the indexes. To investigate this, we calculated the average turnover of the candidate indexes over the simulated history. Table 6 shows the turnover averaged over nine reconstitutions, from 2002 to 2010.

Table 6 / Average turnover of the Value indexes, percent of market value, at reconstitutions 2002–2010. Without banding.

Variables		U.S. Large Cap		U.S. Small Cap		Global	
Value	**Growth**	**Adds pct**	**Deletes pct**	**Adds pct**	**Deletes pct**	**Adds pct**	**Deletes pct**
B/P	LTG	14	14	17	18	21	19
B/P	MTG3	23	22	25	26	27	25
B/P	MTG2	25	25	27	29	29	27
B/P	SPS3YGR	15	16	21	20	21	19
B/P	SPS5YGR	13	13	20	18	18	16
B/P	MTG2 SPS3YGR	16	16	23	22	21	20
B/P	MTG2 SPS5YGR	16	16	22	22	21	19

As we suspected, substituting MTG2 for LTG increased turnover. The combination B/P + MTG3 had slightly lower turnover than B/P + MTG2, which is consistent with the notion that shorter-term forecasts may be more volatile than longer-term forecasts. Both of those combinations, however, gave undesirably greater turnover than the current B/P + LTG variables.

Addition of a second growth variable

Historical growth measures, such as sales per share growth, are smoothed by construction, with longer-term averages smoother than shorter-term averages. Smoother variables might lead to less turnover. The results in Table 6 confirm this intuition, showing that the longer-term SPS5YGR resulted in lower turnover than did SPS3YGR. Adding a historical growth variable to the inputs, then, might result in a good representativeness and lower turnover. Table 7 shows results for various combinations of B/P, MTG2 and one other growth variable.

Table 7 / Measures of fit for three-variable indexes. Absolute deviations from average style universe portfolios at reconstitution are averaged from 2003 to 2010. Global Developed measures are averaged from 2005 to 2010. A smaller number indicates a closer fit. Results are rounded to whole numbers. Cases B/P + LTG and B/P + MTG2 are included for comparison. Highlighted cells are the lowest entries, not including the first two rows, in each column.

Variables		U.S. Large Cap		U.S. Small Cap		Global Large Cap		Global ex-U.S. Large Cap	
Value	**Growth**	**Value**	**Growth**	**Value**	**Growth**	**Value**	**Growth**	**Value**	**Growth**
B/P	LTG	72	72	113	114	110	108	101	112
B/P	MTG2	78	79	116	118	111	108	101	110
B/P	MTG2 STG	79	79	117	118	111	108	102	112
B/P	MTG2 SUSTGR	80	81	118	119	114	112	106	113
B/P	MTG2 EPS3YGR	78	80	115	118	112	111	103	112
B/P	MTG2 EPS5YGR	76	79	115	118	112	110	103	112
B/P	MTG2 SPS3YGR	77	79	116	118	111	110	102	113
B/P	MTG2 SPS5YGR	76	79	115	118	111	111	102	113
B/P	MTG2 PMOM	80	80	116	119	112	110	103	111

The results in Table 7 show that, for the U.S. universes, adding SPS5YGR to the combination of B/P and MTG2 improved the fit. This combination of three variables works reasonably well for the global large cap and global ex-U.S. universes also.

Addition of a second value variable

The results for single-variable indexes in Table 4 suggested that the cash-flow-to-price (CFP) ratio might be nearly as useful as B/P for indicating value. We were cautious with this variable, because cash flow might not be equally meaningful across all industries and could be problematic in certain sectors, such as financials. Tables 8 and 9 show the results when CFP is added to the B/P + MTG2 + SPS5YGR combination of inputs.

Table 8 / Measures of fit with additional value variable. Absolute deviations from average style universe portfolios at reconstitution are averaged from 2003 to 2010. Global Developed measures are averaged from 2005 to 2010. A smaller number indicates a closer fit. Results are rounded to whole numbers.

Variables		U.S. Large Cap		U.S. Small Cap		Global Large Cap		Global ex-U.S. Large Cap	
Value	**Growth**	**Value**	**Growth**	**Value**	**Growth**	**Value**	**Growth**	**Value**	**Growth**
B/P	MTG2 SPS5YGR	76	79	115	118	111	111	102	113
B/P CFP	MTG2 SPS5YGR	73	75	114	118	110	108	101	111

Table 9 / Average turnover of the Value indexes with additional value variable, percent of market value, at reconstitutions 2002–2010. Without banding.

Variables		U.S. Large Cap		U.S. Small Cap		Global	
Value	**Growth**	**Adds pct**	**Deletes pct**	**Adds pct**	**Deletes pct**	**Adds pct**	**Deletes pct**
B/P	MTG2 SPS5YGR	16	16	22	22	21	19
B/P CFP	MTG2 SPS5YGR	19	19	24	26	24	22

The results are mixed. Although Table 8 suggests that adding CFP might improve representativeness, Table 9 shows that turnover was increased with the additional variable. In light of our a priori concerns, these results did not present a compelling case for adding this variable.

Our experiments with alternative variables have confirmed an observation from previous research (Haughton and Pritamani 2005), that simply adding variables does not necessarily improve the characteristics of style indexes. Table 9 provides a counter-example to the notion that more variables result in lower turnover. Determining which variables to include requires judicious balancing of multiple criteria, such as data availability, representativeness, turnover, intuitiveness, simplicity and so on.

Turnover reduction

The average turnover using the B/P + MTG2 + SPS5YGR combination was greater than that of the current B/P + LTG combination, as seen in Table 6. We considered ways to further reduce turnover without affecting the fundamental properties of the style indexes. After testing several ideas, we identified a method that is analogous to the "banding" that is applied to cap size breaks in the current methodology.

In cap break banding, the stock's capitalization must exceed a threshold, or band, beyond the designated cap break before the stock is moved to the next cap tier index. Similarly to this approach, we require that a stock's composite value score (CVS) must change by an amount larger than a certain threshold, compared to the prior year, before it is assigned a new CVS. Implementing this method suppresses small changes in CVS, while allowing large changes to occur. Larger changes in CVS indicate more significant changes in a stock's characteristics than do smaller changes. Removing small changes in CVS leaves the stock's probability close to its previous value.

The value/growth probabilities are assigned using the Russell nonlinear function applied to the CVS values. The function, combined with the 5%/95% rule, results in about 30% of the index (by market cap) assigned as pure growth, about 30% pure value and about 35% partial growth/value. Banding the CVS scores preserves this relationship. If a similar banding were applied directly to the probabilities, the proportions of pure growth/blended/pure value would not be maintained.

A key parameter of CVS banding is the threshold for CVS changes. We tested several threshold values to determine a setting of this parameter. Results are shown in Table 10.

Table 10 / Average turnover of the Value indexes, percent of market value, at reconstitutions 2002–2010. With CVS banding.

Variables		U.S. Large Cap		U.S. Small Cap		Global	
Value	Growth	Adds pct	Deletes pct	Adds pct	Deletes pct	Adds pct	Deletes pct
Without banding							
B/P	LTG	14	14	17	18	21	19
B/P	MTG2 SPS5YGR	16	16	22	22	21	19
With CVS banding +/- 0.10							
B/P	MTG2 SPS5YGR	15	14	21	21	20	18
With CVS banding +/- 0.15							
B/P	MTG2 SPS5YGR	13	13	19	19	18	16
With CVS banding +/- 0.20							
B/P	MTG2 SPS5YGR	11	11	18	17	17	14

The threshold determines the width of the band. The wider the band, the lower the turnover should be, because more stocks are kept at their previous CVS values. The results in Table 10 show this effect. Unbanded, the average turnover for the U.S. large cap value index using the new variables would have been 16 percent. With a threshold of 0.20, the turnover would have averaged 11 percent. We chose a band of +/- 0.15, which produced average turnover comparable to the levels of the current methodology.

Relatively small changes in CVS tend to have relatively small impact on the resulting indexes. Therefore, we should expect banding to have small effect on the indexes. To verify this intuition, Table 11 compares the measures of fit for the proposed combination of variables with and without banding. The results show negligible impact on the representativeness of the indexes.

Table 11 / Measures of fit for candidate index with and without CVS banding.

Variables		U.S. Large Cap		U.S. Small Cap		Global Large Cap		Global ex-U.S. Large Cap	
Value	**Growth**	**Value**	**Growth**	**Value**	**Growth**	**Value**	**Growth**	**Value**	**Growth**
Without banding									
B/P	LTG	72	72	113	114	110	108	101	112
B/P	MTG2 SPS5YGR	76	79	115	118	111	111	102	113
With CVS banding +/-0.15									
B/P	MTG2 SPS5YGR	76	79	115	118	110	111	100	112

Conclusion

The declining availability of I/B/E/S LTG forecasts prompted a reassessment of the methodology of the Russell growth and value style indexes. We tested alternative single variables and combinations of variables by computing candidate indexes and comparing them to average holdings of portfolios in the Russell Manager Universes. We found that book-to-price (B/P) continues to be a robust measure of value. Combining B/P with medium term growth rate (MTG2) based on I/B/E/S two-year earnings forecast, and five-year historical sales per share growth (SPS5YGR) variables resulted in simulated indexes that were close to the existing indexes when compared to the universe holdings. Introducing banding of the combined value scores (CVS) reduced the turnover of the candidate indexes to average levels that are comparable or less than that of the current methodology.

Appendix – Manager Universe Descriptions

Global Large Cap Growth Equity Portfolios (INTWLDGRO)
This universe includes manager portfolios within the Global Large Cap Equity universe that invest in securities typically trading at a valuation premium, on both a historical and a projected basis compared to the broad market. These portfolios will also usually exhibit characteristics of above-average forecast growth rates and profitability and below-market dividend yield. A bias toward faster-growing sectors and stocks means these portfolios often have greater-than-market volatility (beta above 1.00). The specific investment approaches used by managers in this universe range from growth-at-a-reasonable-price to earnings and price momentum.

Universe Benchmark: Russell Global Growth Index

Global Large Cap Value Equity Portfolios (INTWLDVAL)
This universe includes manager portfolios within the Global Large Cap Equity universe that invest in securities trading at discounted multiples relative to the broad market or historic levels. These portfolios often exhibit characteristics of above-average dividend yield and higher debt/equity levels. Volatility vs. the market is variable depending on the manager, but generally these portfolios have betas less than 1.00. The universe contains a mix of traditional deep-discount managers, contrarian managers and those who seek relative valuation opportunities.

Universe Benchmark: Russell Global Value Index

Global x-US Large Cap Growth Equity Portfolios (REPEAGRO)
This universe includes manager portfolios within the Global x-US Large Cap Equity universe that are typically holding securities trading at a valuation premium, on both a historical and a projected basis, compared to the broad market. These portfolios will also usually exhibit characteristics of above-average forecast growth rates and profitability and below-market dividend yield. A bias toward faster-growing sectors and stocks means these portfolios often have greater-than-market volatility (beta above 1.00). The specific investment approaches used by managers in this universe range from growth-at-a-reasonable-price to earnings and price momentum.

Universe Benchmark: Russell Global ex-U.S. Growth Index

Global x-US Large Cap Value Equity Portfolios (REPEAVAL)
This universe includes manager portfolios within the Global x-US Large Cap Equity universe that are holding securities trading at discounted multiples relative to broad-market or historic levels. These portfolios often exhibit characteristics of above-average dividend yield and higher debt/equity levels. Volatility vs. the market is variable depending on the manager, but generally these portfolios have betas less than 1.00. The universe contains a mix of traditional deep-discount managers, contrarian managers and those who seek relative valuation opportunities.

Universe Benchmark: Russell Developed ex-U.S. Value Index

US Large Cap Growth Equity Portfolios (EARNINGS)
Managers in this style try to identify large cap companies with above-average earnings growth prospects. In general, two basic categories of securities are owned: those of companies with consistent above-average historical and prospective profitability and growth, and those of companies expected to generate above-average near-term earnings momentum based upon company, industry or economic factors. In this category, securities may not have exhibited above-average historical growth but are expected to do so over the near future.

- These managers are willing to pay above-market multiples for the superior growth rate/profitability they anticipate. Other typical characteristics of this style include selection of higher-quality companies; emphasis on consumer service, health care and technology stocks; and light weightings in deep cyclicals and defensive stocks.
- The focus is on earnings growth and/or profitability, either above average or accelerating. In addition, dividend yield is frequently well below market averages, valuation statistics are typically above market averages, the volatility of returns is above that of the market and beta is frequently above 1.00.

Universe Benchmark: Russell 1000® Growth

US Large Cap Value Equity Portfolios (PRICE)
Managers in this group are large cap "value investors." While differences exist in how managers in this style define "value," an issue's current market price is a critical variable. For example, some organizations focus on companies having low absolute or relative P/E ratios, while others stress issues with above-market dividend yields. Additional measures that are frequently used are price/book value and price/sales ratios. A stock whose price has declined because of adverse investor sentiment may also attract some of these managers. Historical growth and profitability characteristics frequently are well below market averages, and overall characteristics are in sharp contrast to those of growth managers.

- The focus is on buying securities at low valuations on an absolute basis or relative to the market and/or historical levels.
- Portfolios typically exhibit below-average price/book value ratios, below-average P/E ratios and/or high dividend yields.
- Risk characteristics in terms of volatility and beta vary but frequently are below market averages.

Universe Benchmark: Russell 1000® Value

US Small Cap Growth Equity Portfolios (SMCPEARN)
These managers emphasize less-seasoned companies with above-average long-term growth prospects. Portfolios typically display heavy concentrations in technology, health care, consumer and service sectors, and above-market valuation characteristics.

Universe Benchmark: Russell 2000® Growth

US Small Cap Value Equity Portfolios (SMCPRICE)
These managers select small, under-researched companies that are considered undervalued relative to earnings, assets or revenues. Portfolios typically emphasize financial services, regulated industries and industrial cyclicals, and exhibit below-average valuation and growth characteristics.

Universe Benchmark: Russell 2000® Value

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