FTSE Russell Smart Beta Indexes
(The 10 minute version focused on multifactor indexes)

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FTSE Russell Smart Beta Index Offerings

Smart Beta

Factor Exposure Indexes	Alternatively Weighted Indexes
Single Factor Indexes Quality Size Value Volatility Yield Momentum Residual Momentum Illiquidity **Multifactor Indexes** Tilt-Tilt Multifactor Indexes	**Risk Weighted** FTSE Global Minimum Variance EDHEC Risk Efficient Equal Risk Contribution Equal Weight Index Russell High Efficiency Defensive (HEDI) **Fundamentally Weighted** FTSE RAFI Index Series Russell Fundamental Index Russell Fundamental Select Real Estate FTSE RAFI Low Volatility FTSE RAFI Equity Income

Single factors and their rationale

Quality
Good companies tend to do better than bad ones
Definition: Composite of profitability, efficiency, earnings quality, leverage

Volatility
Stocks that exhibit low volatility tend to perform better than stock with high volatility
Definition: Standard deviation of 5 years of weekly local total returns

Yield
High yielding stocks (dividends) tend to perform better than stocks with low dividends
Definition: Log of each company's 12 month trailing dividend yield

Momentum (2 Definitions)
Securities tend to continue to do what they are already doing (either rising or falling in price)
Definition: Cumulative 11 month return, or residual Sharpe ratio

Illiquidity
Securities which are more illiquid tend to perform better than those which trade more frequently
Definition: Log Amihud ratio

Size
Smaller companies tend to perform better than larger ones
Definition: Log full market cap

Value
Stocks that appear cheap tend to perform better than stock that appear expensive
Definition: Composite of cash flow yield, earnings yield and country relative Sales:Price ratio

Multifactor indexes

- Why? Diversification and interaction of factors
  - Any single factor has variable performance, but often different cycles
  - Negative excess return correlation between some factors reduces tracking error
  - Potential economies in cross trading between factors
  - Factor timing very hard to do

- Challenge: How to combine multiple factors in one index without cancelling out the factor exposures

The evolution of multifactor indexes
(by strength of factor exposure)

Good: Composite Index

- Combine the weightings of individual factor indexes (e.g. 50% Momentum + 50% Value)
- Easy top-down approach
- Factor timing easy to implement (if you can do it successfully)

Better: Composite Factor

- Combine individual factors in bottom-up approach
- Better capture of interaction between factors
- Potential trading economies

Best: Tilt-Tilt approach

- Multiplicative: tilts each factor on top of the other
- Similar to double sorting, but sharper focus
- Factor exposures not washed away by combining

Start with a three stock cap-weighted index and create a value index

	Cap Weight	X	Value Score	=	Unadj Wgt.	Final Wgt.
Ford	**22.8%**	X	1.00	=	22.8%	**61.9%**
Costco Wholesale	**20.0%**	X	0.50	=	10.0%	**27.2%**
facebook	**57.2%**	X	0.07	=	4.0%	**10.9%**
SUM	**100 %**				36.8%	**100%**

Now create a quality index

	Cap Weight	X	Quality Score	=	Unadj Wgt.	Final Wgt.
Ford	**22.8%**	X	0.26	=	5.9%	**13.6%**
Costco Wholesale	**20.0%**	X	0.68	=	13.6%	**31.2%**
facebook	**57.2%**	X	0.42	=	24.0%	**55.2%**
SUM	**100%**				43.6%	**100%**

A multifactor index using the composite index method

	(Value Wgt. + Quality Wgt.)/2	=	Composite Index Wgt.
Ford	(61.9% + 13.6%)/2	=	**37.7%**
Costco Wholesale	(27.2% + 31.2%)/2	=	**29.2%**
facebook	(10.9% + 55.2%)/2	=	**33.0%**
SUM	100%		**100%**

A multifactor index using the composite factor method

	Cap Wgt. X	(Val + Qual Scores)/2	=	Unadj. Wgt.	Final Wgt.
Ford	**22.8%**	x (1.0 + 0.26)/2	=	20.8%	**35.7%**
Costco Wholesale	**20.0%**	x (0.5 + 0.68)/2	=	17.1%	**29.4%**
facebook	**57.2%**	x (0.07 + 0.42)/2	=	20.3%	**34.9%**
SUM	**100%**			58.2%	**100%**

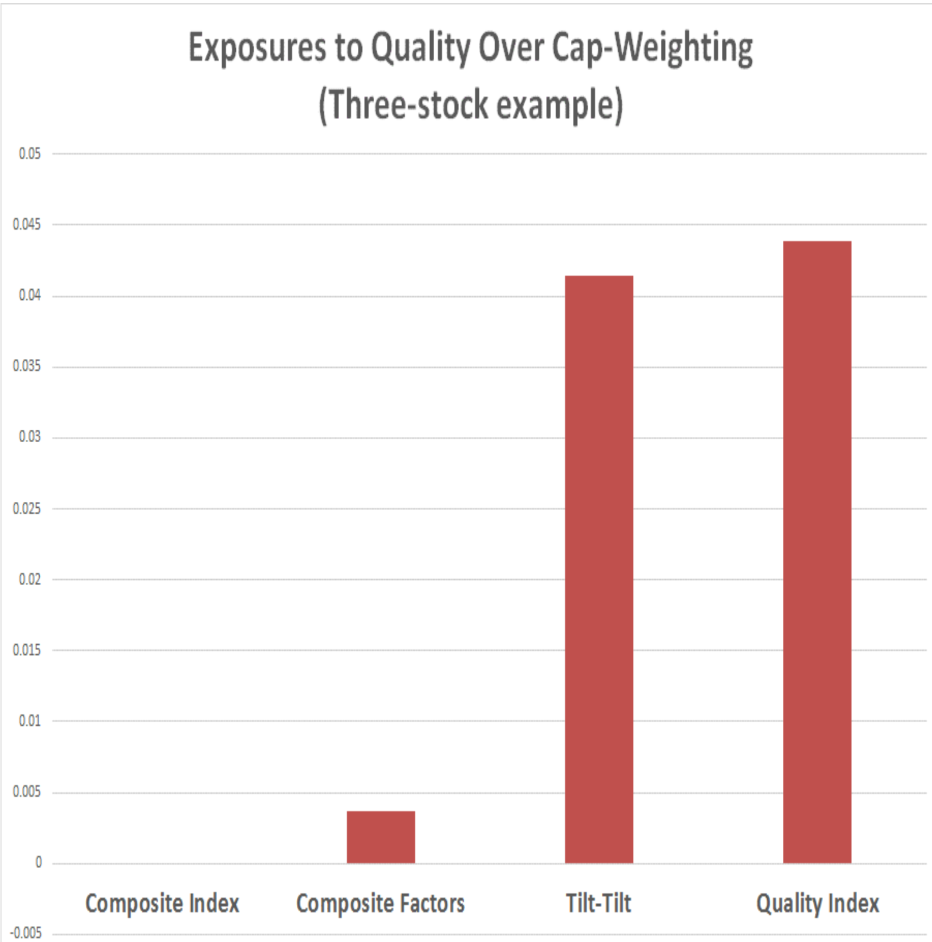
A multifactor index using the tilt-tilt method

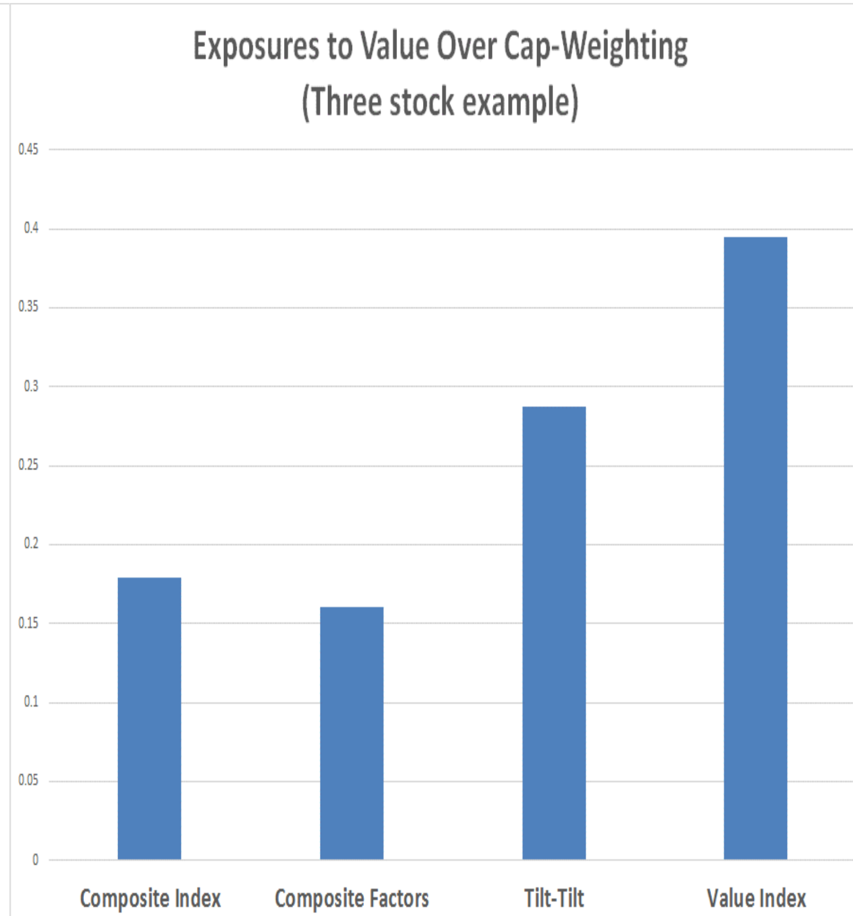
	Cap Wgt.	X	Val Score	X	Qual Score	=	Unadj Wgt.	Final Wgt.
Ford	**22.8%**	X	1.00	X	0.26	=	5.9%	**41.1%**
Costco Wholesale	**20.0%**	X	0.50	X	0.68	=	6.8%	**47.2%**
facebook	**57.2%**	X	0.07	X	0.42	=	1.7%	**11.7%**
SUM	**100%**						14.4%	**100%**

Active weights from the three multifactor methods combining value and quality

	Composite Index	Composite Factor	Tilt-Tilt
Ford	15.0%	12.9%	18.3%
Costco Wholesale	9.2%	9.4%	27.2%
facebook	-24.2%	-22.3%	-45.6%
SUM	0.0%	0.0%	0.0%

What difference does it make?
Less dilution of factor exposures



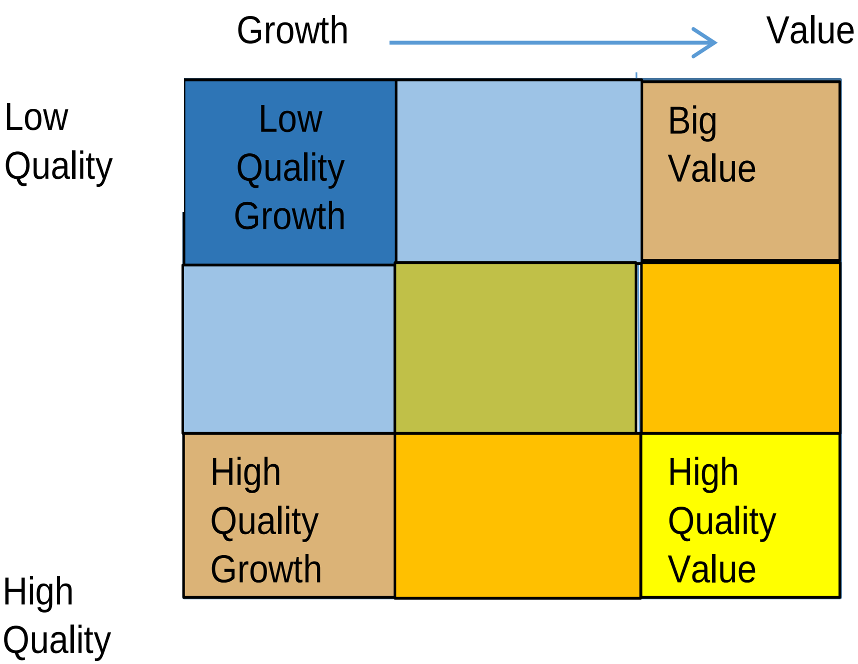


Simulated exposures of three stock indexes

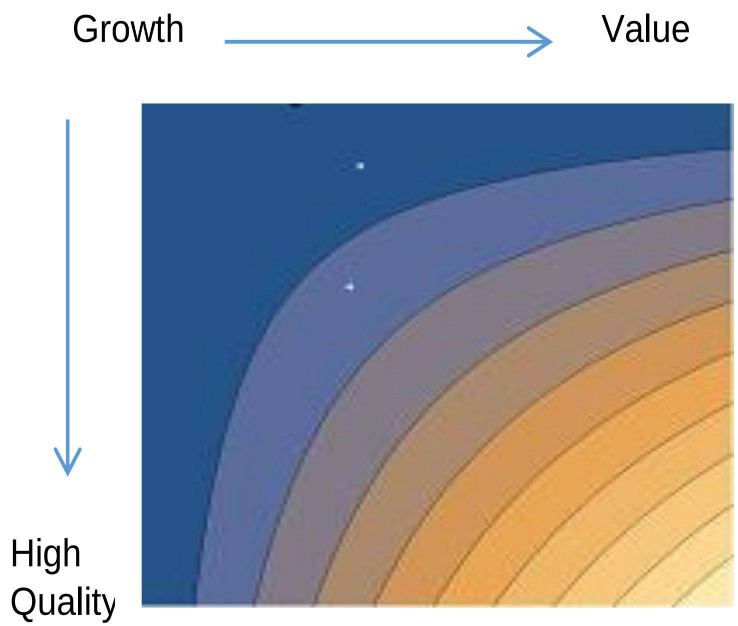
Tilt-tilt is similar to double sorting but more granular and targeted

- Double sort versus tilt-tilt

Double Sort Approach



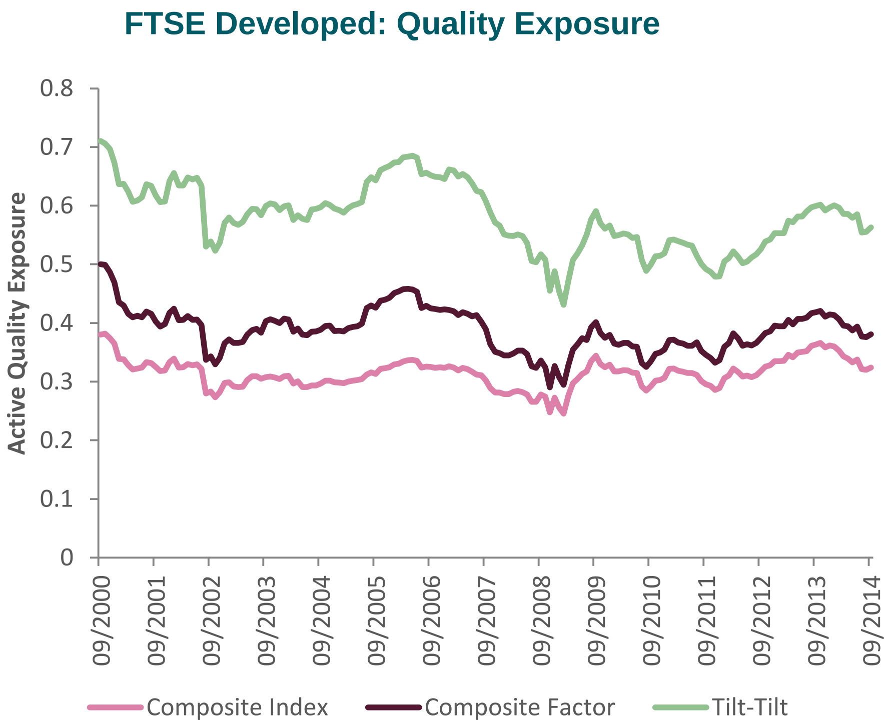
Tilt-Tilt Approach

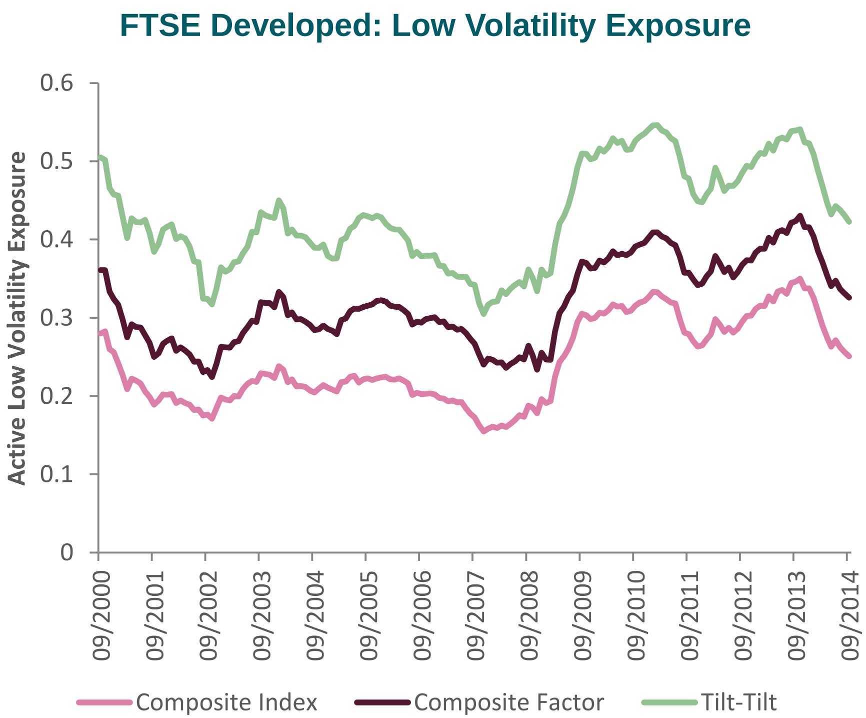


Examples using the full universe of the FTSE Developed Index: Quality & Low Volatility

Tilt-Tilt improves factor exposure for positively correlated factors

Consistently greater factor exposure compared to other approaches:





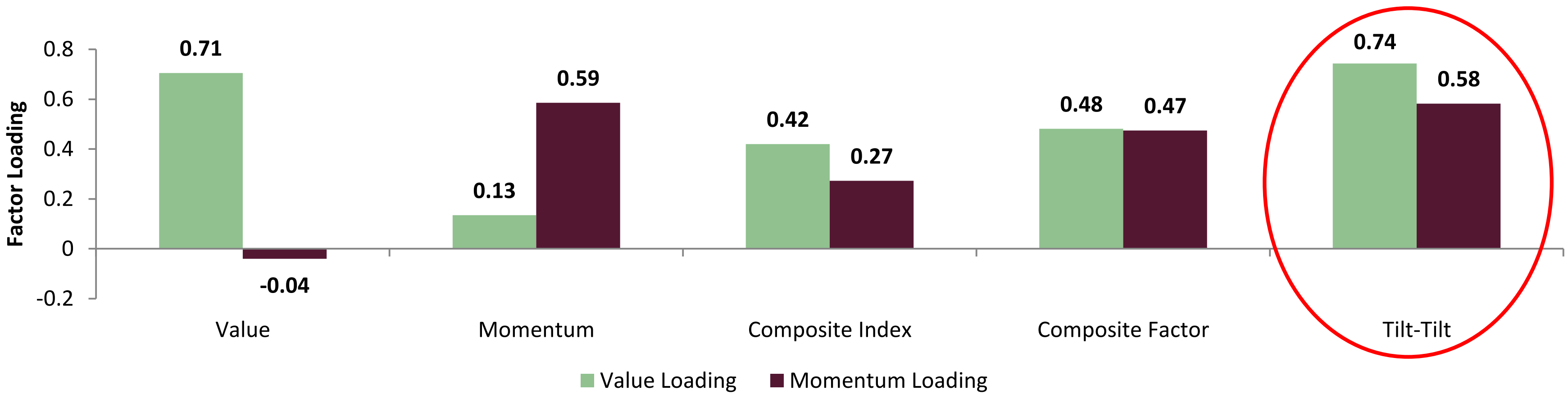
FTSE Developed, Quality + Low Volatility Factor, September 2000-September 2014

Source: FTSE Group. Data as at Sep. 2014. Past performance is no guarantee of future results. Returns shown may reflect hypothetical historical performance. See slide 19 for legal disclosures.

Value & Momentum

Tilt-Tilt also improves factor exposure for negatively correlated factors

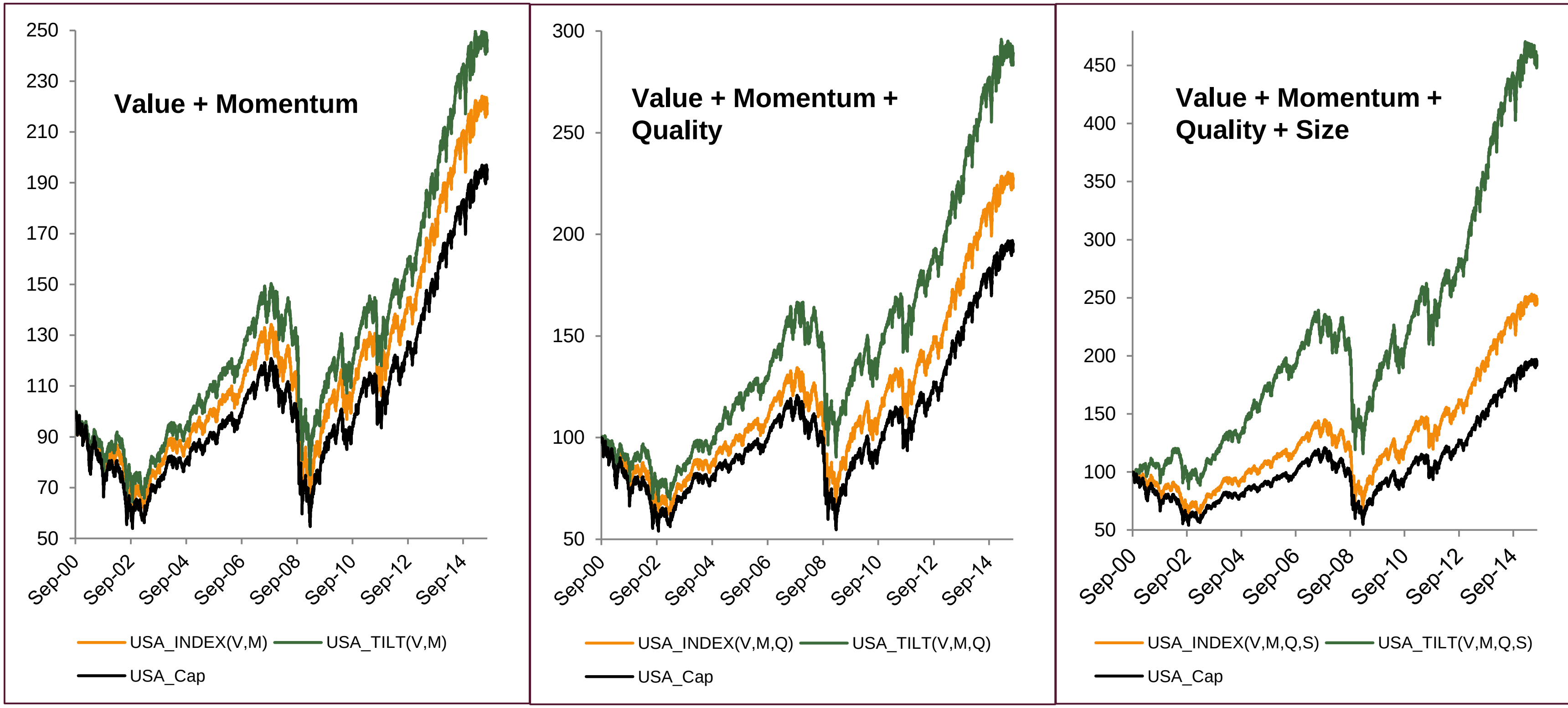
Consistently greater factor exposure compared to other approaches:



- Composites offset factor exposures
- Tilt-tilt results in a genuine two factor index with approximately the same magnitude of value and momentum loading as those targeted in the single factor indexes
- Identifies stocks displaying both characteristics

Implementing a multifactor Index

Gaining exposure to multiple factors becomes increasingly challenging using allocations to single factor indexes.



- Each panel compares simulated performance of **composite** vs. **tilt-tilt** variants of 2, 3, and 4 factor indexes versus the FTSE USA cap-weighted index.
- As additional factors are added, composite indexes becomes less effective in capturing exposure to the desired factors

Conclusions

- The use of multifactor indexes has become increasingly popular as a diversification tool and potential source of excess index return
- However, index construction is more important than ever in order to ensure that factor exposures are captured while keeping in mind practical implementation considerations
- Using the FTSE tilt-tilt approach to constructing multifactor Indexes is effective, transparent and does not rely on a risk-model or complex optimization techniques
- Gaining exposure to multiple factors becomes increasingly challenging using allocations to single factor indexes
- Therefore, when making an allocation to a multi-factor index, a higher and more efficient factor exposure can be targeted by using a tilt-tilt index

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