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EUE4DEE and EUE3DEE Comparison Datasheet

Barra Europe Equity Derived-Eastern Europe Model

New Features in the EUE4DEE Model
• **Improved risk forecast for optimized portfolios using the new Optimization Bias Adjustment methodology**
• **More responsive forecasts through the use of our new Volatility Regime Adjustment methodology**
• **New Daily-Horizon model to cater to investors with short investment horizons**
• **Enhanced style factors reflecting the latest research**
• **Full daily updates of the model including daily exposures**
• **Improved specific risk model, including Volatility Regime Adjustment and Bayesian Adjustment**
• **Addition of new frontier markets**

Model Summary	
EUE3DEE	**EUE4DEE**
Asset Coverage[1]: 16,050+	**Asset Coverage[1]: 17,000+**
Model Estimation Universe[2]: 2,190+	**Model Estimation Universe[2]: 1,670+**
Style Factors: 9	**Style Factors: 11**
Industry Factors: 58	**Industry Factors: 58**
Country Factors: 29	**Country Factors: 34**
Currency Factors: 30	**Currency Factors: 35**
Market Factor: 2	**Market Factor: 2**
Covariance matrix built on daily data	**Covariance matrix built on daily data**

[1] As of February 2013

[2] Estimation universe definition changed for EUE4DEE to avoid illiquid assets and hence have a smaller but more robust result.

Model Features Comparison	EUE3DEE	EUE4DEE
Model Start Dates	**Aegis: 30 December 1994** **Barra Portfolio Manager (BPM): 31-December 2002** **Models Direct Data: 30 December 1994**	**Aegis: 30 December 1994** **Barra Portfolio Manager (BPM): 31 December 2002[3]** **Models Direct Data: 30 December 1994**
Estimation Universe	**Based on MSCI AC Europe IMI, enhanced with further small-cap assets and non-index assets for frontier markets**	**MSCI All Country Europe Investable Market Index (IMI). Frontier markets added through MSCI Europe & CIS Frontier Market Index, stand-alone MSCI country indices, and further non-index assets**
Regression Weighting Scheme	**Constant weights for the 5% largest stocks, square root of capitalization for the remainder**	**Square root of market capitalization**

Covariance Matrix: Half-life

EUE3DEE:

<u>Long-Term</u>
Variances: 250 days
Correlations: 500 days

<u>Short-Term</u>
Variances: 90 days
Correlations: 180 days

EUE4DEE:

	Long	Short	Daily
Half-life for Volatility	**252 days**	**84 days**	**42 days**
Newey-West Volatility Lags	**10 days**	**10 days**	**N/A**
Half-life for Correlations	**504 days**	**504 days**	**200 days**
Newey-West Correlation Lags	**3 days**	**3 days**	**N/A**
Half-life for Volatility Regime Adjustment	**84 days**	**21 days**	**4 days**

Specific Risk

EUE3DEE:

<u>Long-Term</u>
Asset-level historical Volatility: 180 days

<u>Short-Term</u>
Asset-level historical Volatility: 65 days

Linked Specific Risk available

EUE4DEE:

	Long	Short	Daily
Half-life for Specific Volatility	**252 days**	**84 days**	**42 days**
Newey-West Auto-Correlation Lags	**5 days**	**5 days**	**N/A**
Newey-West Auto-Correlation Half-Life	**252 days**	**252 days**	**N/A**
Bayesian Shrinkage Parameter	**0.15**	**0.15**	**0.10**
Half-life for Volatility Regime Adjustment	**168 days**	**42 days**	**4 days**
Linked Specific Risk available	**Yes**	**Yes**	**Yes**

Model Features Comparison	EUE3DEE	EUE4DEE
Industry Allocation Scheme	**Single-industry allocation**	**Single-industry allocation**
Source of Industry Scheme	**Based on Global Industry Classification Standard (GICS®)**	**Based on Global Industry Classification Standard (GICS®)**

[3] Upcoming in Q2 2013

Risk Factor Definitions	EUE3DEE	EUE4DEE
Beta[4]	N/A (used as descriptor in the EUE3BAS Volatility factor)	Captures the market risk that cannot be explained by the Market Equity factors
Momentum[4]	Describes risk associated with the trending behavior of stock returns over a horizon of about a year	Explains the return differences of stocks based on their relative performance over the trailing 6-12 months
Residual Volatility[4]	N/A (used as a descriptor in the EUE3BAS Volatility factor)	Explains returns associated with high-volatility stocks that are not captured by the beta factor
Volatility	Captures return and risk differences between high-beta and low-beta stocks. Complements the regional market factor, which represents the volatility of a broadly diversified market portfolio with β=1.	N/A (split between Beta and Residual Volatility)
Size[5]	Captures systematic return and risk differences between large-cap and small-cap stocks	Captures the return differences between large-cap stocks and small-cap stocks
Earnings Yield[5]	Relates the current market valuation of a company to its ability to generate positive earnings and cash flows	Describes return differences based on a company's earnings relative to its price
Book-to-price[5]	N/A (contained in EUE3BAS Value factor as a descriptor)	Explains the return component attributable to a stock's book-to-price ratio and can be an indicator of value
Dividend-to-price[5]	N/A (use of Dividend Yield in EUE3BAS)	Explains the return component attributable to a stock's dividend-to-price ratio and can be an indicator of earnings
Dividend Yield	Yield based on past 12-month dividends	N/A (replaced by Dividend-to-price)
Value	Indicates how "inexpensively" a company is currently traded by using its book value and past revenues as yardsticks	N/A (replaced by Book-to-Price)
Liquidity[5]	Helps to assess systematic risk associated with infrequent trading	Describes the return differences of stocks based on their relative trading activity
Non-linear Size[5]	N/A	Describes size-related returns to stocks that are not captured by the size factor
Financial Leverage[5]	N/A (called Leverage in EUE3BAS)	Captures the return differences between high-leverage and low-leverage stocks
Growth[5]	Captures risk related to fundamental company growth	Describes return differences of stocks based on their prospects for sales or earnings growth
Leverage	Captures the relationship between a firm's stock returns and its level of indebtedness	N/A (replaced by Financial Leverage)

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[4] Factors standardized by Europe region in EUE4DEE.

[5] Factors standardized by Country in EUE4DEE.

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Risk Factor Descriptors	EUE3DEE	EUE4DEE
Beta[4]	N/A	• **Historical Beta (1.000)**
Momentum[4]	• **Historical weekly alpha (0.24)** • **12-month relative strength, lagged by 1 month (0.36)** • **6-month relative strength, lagged by 1 month (0.40)**	• **Relative strength (0.600)** • **Historical alpha (0.400)**
Residual Volatility[4]	N/A	• **Historical sigma (0.100)** • **Daily standard deviation calculation (0.600)** • **Cumulative range (0.300)**
Volatility	• **Historical weekly beta (0.53)** • **Cumulative Range (0.25)** • **Daily Asset Volatility (0.22)**	N/A
Size[5]	• **Log of the month-end issuer capitalization (0.5)** • **Log of total assets (0.5)**	• **Log of market capitalization (1.000)**
Earnings Yield[5]	• **Trailing earnings-to-price ratio (0.10)** • **Cash earnings-to-price ratio (0.17)** • **Return on equity (0.13)** • **Predicted earnings-to-price ratio (0.60)**	• **Cash earnings-to-price ratio (0.214)** • **Trailing annual earnings-to-price ratio (0.143)** • **Analyst-predicted earnings-to-price-ratio (0.643)**
Book-to-price[5]	N/A	• **Book-to-price ratio (1.000)**
Dividend-to-price[5]	N/A	• **Dividend-to-price ratio (1.000)**
Dividend Yield	• **Dividend yield (1.0)**	N/A
Value	• **Book-to-price ratio (0.62)** • **Sales-to-price ratio (0.38)**	N/A
Liquidity[5]	• **Log of annual share turnover (0.42)** • **Log of quarterly share turnover (0.36)** • **Log of monthly share turnover (0.22)**	• **Annual share turnover (0.200)** • **Quarterly share turnover (0.350)** • **Monthly share turnover (0.450)**
Non-linear Size[5]	N/A	• **Size-non-linear (1.000)**
Financial Leverage[5]	N/A	• **Debt-to-assets ratio (0.500)** • **Book leverage (0.400)** • **Market leverage (0.100)**
Growth[5]	• **Trailing growth of total assets (0.23)** • **Trailing growth of annual sales (0.07)** • **Trailing growth of annual net earnings (0.05)** • **Short-term predicted earnings growth (0.50)** • **Long-term (3-5 years) predicted earnings growth (0.15)**	• **Earnings growth rate over last five years (0.700)** • **Sales growth (0.150)** • **Analyst-predicted earnings growth (0.150)**
Leverage[5]	• **Book leverage (0.59)** • **Market leverage (0.41)**	N/A

The Industry factors listed below are duplicated and split into Eastern and Western Europe. For example, Factor 1 in the following table is Energy Equipment and Services. It is split into Eastern Europe Energy Equipment and Services and Western Europe Energy Equipment and Services.

Industry Factors[6]	
EUE3DEE	**EUE4DEE**
1. Energy Equipment & Services	1. Energy Equipment and Services
2. Oil Gas & Consumable Fuels	2. Oil Gas and Consumable Fuels
3. Other Materials	3. Other Materials
4. Metals & Mining	4. Metals and Mining
5. Other Capital Goods	5. Other Capital Goods
6. Construction & Engineering	6. Construction and Engineering
7. Machinery	7. Machinery
8. Commercial Services	8. Commercial Services
9. Other Transport	9. Transportation Non-Airlines
10. Airlines	10. Airlines
11. Autos & Components	11. Automobiles and Components
12. Consumer Durables & Apparel	12. Consumer Durables and Apparel
13. Consumer Services	13. Hotels Restaurants and Leisure
14. Media	14. Media
15. Retailing	15. Retailing
16. Food & Staples Retailing	16. Food Drug Staples Retailing
17. Food Beverages & Tobacco	17. Food Beverages and Tobacco
18. Household & Personal Products	18. Household and Personal Products
19. Healthcare Equipment & Services	19. Health Care Equipment and Serv
20. Pharmaceuticals	20. Pharmaceuticals Life Sciences
21. Banks	21. Banks
22. Diversified Financials	22. Diversified Financials
23. Insurance	23. Insurance
24. Real Estate	24. Real Estate
25. Software & Services	25. IT Services and Software
26. Technology Hardware & Equipment	26. Technology Hardware and Equip
27. Semiconductors	27. Semiconductors
28. Telecommunication Services	28. Telecommunication Services
29. Utilities	29. Utilities

[6] Industry factors in EUE3DEE and EUE4DEE are identical except for the minor updates made to the display names.

Country Factors

EUE3DEE

1. Austria	18. Netherlands
2. Belgium	19. Norway
3. Croatia	20. Poland
4. Cyprus	21. Portugal
5. Czech Republic	22. Romania
6. Denmark	23. Russia
7. Estonia	24. Slovenia
8. Finland	25. Spain
9. France	26. Sweden
10. Germany	27. Switzerland
11. Greece	28. Turkey
12. Hungary	29. United Kingdom
13. Iceland	
14. Ireland	
15. Italy	
16. Latvia	
17. Lithuania	

EUE4DEE

1. Austria Mkt	18. *Kazakhstan Mkt*
2. Belgium Mkt	19. Latvia Mkt
3. *Bosnia and Herzegovina Mkt*	20. Lithuania Mkt
4. *Bulgaria Mkt*	21. Netherlands Mkt
5. Croatia Mkt	22. Norway Mkt
6. Cyprus Mkt	23. Poland Mkt
7. Czech Republic Mkt	24. Portugal Mkt
8. Denmark Mkt	25. Romania Mkt
9. Estonia Mkt	26. Russia Mkt
10. Finland Mkt	27. *Serbia Mkt*
11. France Mkt	28. Slovenia Mkt
12. Germany Mkt	29. Spain Mkt
13. Greece Mkt	30. Sweden Mkt
14. Hungary Mkt	31. Switzerland Mkt
15. Iceland Mkt	32. Turkey Mkt
16. Ireland Mkt	33. *Ukraine Mkt*
17. Italy Mkt	34. United Kingdom Mkt

Currency Factors[7]

EUE3DEE

1. Austria	19. Netherlands
2. Belgium	20. Norway
3. Croatia	21. Poland
4. Cyprus	22. Portugal
5. Czech	23. Romania
6. Denmark	24. Russia
7. Estonia	25. Slovenia
8. Euro	26. Spain
9. Finland	27. Sweden
10. France	28. Switzerland
11. Germany	29. Turkey
12. Greece	30. United Kingdom
13. Hungary	
14. Iceland	
15. Ireland	
16. Italy	
17. Latvia	
18. Lithuania	

EUE4DEE

1. Austria	19. *Kazakhstan*
2. Belgium	20. Latvia
3. *Bosnia and Herzegovina*	21. Lithuania
4. *Bulgaria*	22. Netherlands
5. Croatia	23. Norway
6. Cyprus	24. Poland
7. Czech Republic	25. Portugal
8. Denmark	26. Romania
9. Estonia	27. Russia
10. Euro	28. *Serbia*
11. Finland	29. Slovenia
12. France	30. Spain
13. Germany	31. Sweden
14. Greece	32. Switzerland
15. Hungary	33. Turkey
16. Iceland	34. *Ukraine*
17. Ireland	35. United Kingdom
18. Italy	

Market Factors

1. Eastern Europe	2. Western Europe	1. Eastern Europe	2. Western Europe

Note: EUE4DEE covers 5 additional Frontier Markets. These new additions are shown in *italics* in the table above.

[7] Euro is available since 30-Dec-1998.

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[1]*As of March 31, 2012, as published by eVestment, Lipper and Bloomberg in September 2012*   Jan 2013