

Barra US Total Market Equity Deep History Model Datasheet

April 2017

Model Summary	Model Advances
<p>Asset Coverage: 10500+¹</p> <p>Style Factors: 16</p> <p>Industry Factors: 55</p> <p>Market Factor: 1</p>	<ul style="list-style-type: none"> Enhanced style factors based on Systematic Equity Strategies and an industry structure based on Barra’s proprietary industry classification Factors based on premier datasets from MSCI’s comprehensive database and additional leading quantitative data sources. Factor structure and responsiveness aligned with an investment horizon of over six months. Available in Stable and Responsive variants. Contains history back to 1975 with full daily updates. Broad coverage of stocks, cross-listed securities, and Depository Receipts. Volatility Regime Adjustment for more timely and accurate response to sudden changes in market volatility.² Optimization Bias Adjustment to reduce biases in risk forecasts for optimized portfolios. A specific risk model combining structural and time series components. Improved risk forecasts through Volatility Regime Adjustment² and Bayesian Adjustment.

Model Attributes	Details
Application Usage	Barra Aegis Barra PortfolioManager Models Direct
Model Start Dates	Barra Aegis: 31 January 1975 Barra PortfolioManager: 31 January 1975 Models Direct: 31 January 1975

¹ As of April 2017

² In the Responsive variant

Model Attributes	Details		
Estimation Universe	MSCI USA IMI ³ (US component of MSCI All Country World Investable Market Index (ACWI IMI))		
Regression Weighting Scheme	Square root of market capitalization		
Factor Covariance Matrix: Half-life		Stable Variant	Responsive Variant
	Half-life for Volatility	252 days	84 days
	Newey-West Volatility Lags	10 days	10 days
	Half-life for Correlations	756 days	504 days
	Newey-West Correlation Lags	4 days	4 days
	Half-life for Volatility Regime Adjustment	N/A	21 days
Specific Risk: Half-life		Stable Variant	Responsive Variant
	Half-life for Specific Volatility	252 days	84 days
	Newey-West Auto-Correlation Lags	5 days	5 days
	Newey-West Auto-Correlation Half-Life	252 days	252 days
	Bayesian Shrinkage Parameter	0.05	0.05
	Half-life for Volatility Regime Adjustment	N/A	42 days
	Linked Specific Risk available	Yes	Yes
Industry Allocation Scheme	Multiple-industry allocation (up to five industries)		
Source of Industry Scheme	Based on Barra multiple-industry classification		
Model Base Currency	USD		

Style Factors	Purpose	Descriptors
Beta	Explains common variations in stock returns due to different stock sensitivities to market or systematic risk that cannot be explained by the US Country factor.	<ul style="list-style-type: none"> Historical Beta

³ The estimation universe is based completely on the MSCI USA IMI after 1 June 2002. Prior to that, additional rules are applied to create the estimation universe. For details, refer to the Barra US Total Market Equity Deep History Model Empirical Notes.

Style Factors	Purpose	Descriptors
Dividend Yield	Captures differences in stock returns attributable to stock's historical and predicted dividend-to-price ratios.	<ul style="list-style-type: none"> Historical Dividend-to-Price Ratio Analyst-Predicted Dividend-to-Price Ratio
Earnings Quality	Explains stock return differences due to uncertainty around company operating fundamentals (sales, earnings, cash flows) and the accrual components of their earnings.	<ul style="list-style-type: none"> Accruals using Balance Sheet Statement Accruals using Cash-Flow Statement Variability in Sales Variability in Earnings Variability in Cash-Flows Variability of Analyst EPS Estimates to Price
Earnings Yield	Describes stock return differences due to various ratios of the company's earnings relative to its price.	<ul style="list-style-type: none"> Enterprise Multiple (EBITDA to EV) Trailing Earnings-to-Price Ratio Analyst-Predicted Earnings-to-Price Ratio
Growth	Measures company growth prospects using historical sales growth and historical and predicted earnings growth.	<ul style="list-style-type: none"> Long Term Analyst-Predicted Earnings per Share Growth Historical Earnings per Share Growth Rate Historical Sales per Share Growth Rate
Leverage	Captures common variation in stock returns due to differences in the level of company leverage.	<ul style="list-style-type: none"> Market Leverage Book Leverage Debt-to-Assets Ratio
Liquidity	Captures common variations in stock returns due to the amount of relative trading and differences in the impact of trading on stock returns.	<ul style="list-style-type: none"> Monthly Share Turnover Quarterly Share Turnover Annual Share Turnover Modified Amihud Illiquidity Measure Pastor-Stambaugh Illiquidity Measure
Long-Term Reversal	Explains common variation in returns related to a long-term (five years ex. recent thirteen months) stock price behavior.	<ul style="list-style-type: none"> Long-Term Relative Strength Long-Term Historical Alpha
Management Quality ⁴	A combination of asset, investment, net issuance growth measures that captures common variation in stock returns of companies	<ul style="list-style-type: none"> Asset Growth Issuance Growth

⁴ Also known as Investment Quality

Style Factors	Purpose	Descriptors
	experiencing rapid growth or contraction of assets.	<ul style="list-style-type: none"> Capital Expenditure Growth Capital Expenditure
Mid Capitalization	Explains the returns of mid-cap stocks relative to large and small-cap stocks by capturing deviations from linearity in the relationship between returns and the Size factor.	<ul style="list-style-type: none"> Cube of the Size Exposure
Momentum	Explains common variation in stock returns related to recent (twelve months) stock price behavior.	<ul style="list-style-type: none"> Relative Strength
Profitability	A combination of profitability measures that characterizes efficiency of a firm's operations and total activities.	<ul style="list-style-type: none"> Return on Assets Return on Equity Gross Profitability Gross Margin Asset Turnover
Prospect	Explains common variation in stock returns that have exhibited a lottery-like behavior identified through a combination of stock return skewness over a long horizon and drawdown in returns over the recent period.	<ul style="list-style-type: none"> Skewness Maximum Drawdown
Residual Volatility	Captures relative volatility in stock returns that is not explained by differences in stock sensitivities to market returns.	<ul style="list-style-type: none"> Historical Sigma Volatility Implied by One Month Call Option⁵ Volatility Implied by Three Month Call Option⁶ Volatility Implied by One Month Put Option⁷ Volatility Implied by Three Month Put Option⁸
Size	Captures differences in stock returns and risk due to differences in the market capitalization	<ul style="list-style-type: none"> Logarithm of Market Capitalization

⁵ 1-month at-the-money call option

⁶ 3-month at-the-money call option

⁷ 1-month put option

⁸ 3-month put option

Style Factors	Purpose	Descriptors
	of companies.	
Value	Captures the extent to which a company is overpriced or underpriced using a combination of several relative valuation metrics and one structural valuation factor.	<ul style="list-style-type: none"> • Book-to-Price Ratio • Sales-to-Price Ratio • Cash-Flow to Price Ratio • Structural Valuation Factor

Industry Factors	
1. Airlines	29. Home Products
2. Alcohol	30. Hotels
3. Apparel and Textiles	31. Industrial Parts
4. Banks	32. Industrial Services
5. Biotechnology	33. Information Services
6. Chemicals	34. Internet
7. Clothing Stores	35. Leisure
8. Computer Hardware and Business Machines	36. Life and Health Insurance
9. Computer Software	37. Media
10. Construction and Real Property	38. Medical Products and Supplies
11. Consumer Durables	39. Medical Services
12. Defense and Aerospace	40. Mining and Metals
13. Department Stores	41. Motor Vehicles and Parts
14. Drugs	42. Oil Refining
15. Electrical Utility	43. Oil Services
16. Electronic Equipment	44. Property and Casualty Insurance
17. Energy Reserves	45. Publishing
18. Entertainment	46. Railroads
19. Environmental Services	47. Restaurants
20. Equity Real Estate Investment Trusts	48. Securities and Asset Management
21. Financial Services	49. Semiconductors
22. Food and Beverages	50. Specialty Retail
23. Forestry and Paper	51. Telephone
24. Gas and Water Utilities	52. Thrifts
25. Gold	53. Tobacco
26. Grocery Stores	54. Trucking Sea and Air Freight

Industry Factors

- | | |
|--------------------------------|---------------------------------|
| 27. Heavy Electrical Equipment | 55. Wireless Telecommunications |
| 28. Heavy Machinery | |

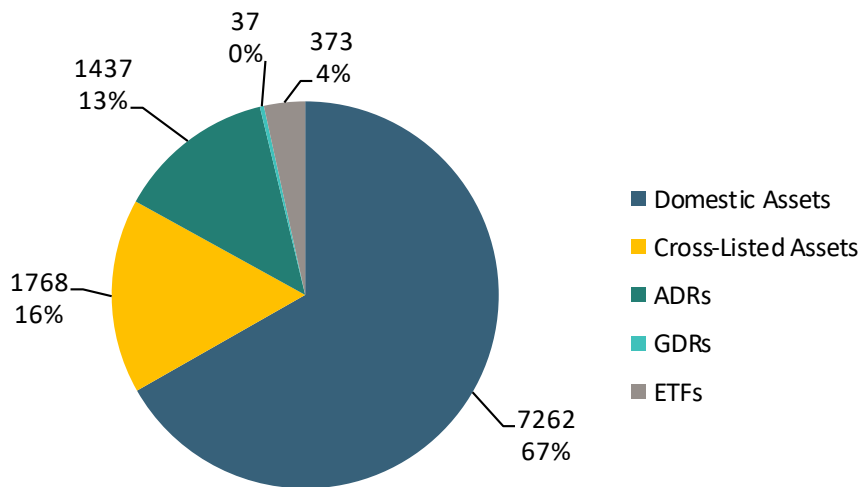
Market Factor

US Country

Model Coverage

Total 10500+ assets as of Apr 2017

- 7262 domestic stocks, including OTC listings
- From NYSE, NASDAQ, and American Stock Exchange. Also includes Pink Sheets and OTC markets.
- 373 ETFs



CONTACT US

AMERICAS

Americas	1 888 588 4567 *
Atlanta	+ 1 404 551 3212
Boston	+ 1 617 532 0920
Chicago	+ 1 312 675 0545
Monterrey	+ 52 81 1253 4020
New York	+ 1 212 804 3901
San Francisco	+ 1 415 836 8800
São Paulo	+ 55 11 3706 1360
Toronto	+ 1 416 628 1007

EUROPE, MIDDLE EAST & AFRICA

Cape Town	+ 27 21 673 0100
Frankfurt	+ 49 69 133 859 00
Geneva	+ 41 22 817 9777
London	+ 44 20 7618 2222
Milan	+ 39 02 5849 0415
Paris	0800 91 59 17 *

ASIA PACIFIC

China North	10800 852 1032 *
China South	10800 152 1032 *
Hong Kong	+ 852 2844 9333
Mumbai	+ 91 22 6784 9160
Seoul	00798 8521 3392 *
Singapore	800 852 3749 *
Sydney	+ 61 2 9033 9333
Taipei	008 0112 7513 *
Thailand	0018 0015 6207 7181 *
Tokyo	+ 81 3 5290 1555

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