

Datasheet - Barra US Total Market Equity Model for Medium-Term Investors

June 2015

Model Summary

Asset Coverage: 19800+¹
Style Factors: 21
Industry Factors: 60
Country Factors: 1

Model Advances

- Alignment of the factor structure with a medium-term investment horizon for more accurate risk forecasts.
- Style factors that reflect the latest research on Systematic Equity Strategies to capture new sources of investment risk. Introduces new factors based on Sentiment, Short Interest, Downside Risk, Industry Momentum, and Regional Momentum.
- Enhanced beta estimation, with Bayesian shrinkage to industry betas to increase accuracy
- Volatility Regime Adjustment methodology designed to calibrate factor volatilities and specific risk forecasts to current market volatility levels
- Optimization Bias Adjustment methodology designed to improve risk forecasts of the optimized portfolios by reducing the effects of sampling error on the factor covariance matrix.
- Robust specific risk model based on daily asset-level returns, incorporating Volatility Regime Adjustment and Bayesian Adjustment techniques for greater forecasting accuracy
- Full daily history and updates
- Historical point-in-time fundamental data updated daily for more realistic backtests

¹ As of 29 May 2015

Model Attributes	Details	
Application Usage	Barra Aegis Barra Portfolio Manager Models Direct	
Model Start Dates	Barra Aegis: 30 June 1995 Barra Portfolio Manager: 30 June 1995 Models Direct: 30 June 1995	
Estimation Universe	MSCI USA Investable Markets Index (USA IMI)	
Regression Weighting Scheme	Square root of market capitalization	
Factor Covariance Matrix: Half-life	Half-life for Volatility	84 days
	Newey-West Volatility Lags	10 days
	Half-life for Correlations	504 days
	Newey-West Correlation Lags	4 days
	Half-life for Volatility Regime Adjustment	21 days
Specific Risk: Half-life	Half-life for Specific Volatility	84 days
	Newey-West Auto-Correlation Lags	5 days
	Newey-West Auto-Correlation Half-Life	252 days
	Bayesian Shrinkage Parameter	0.05
	Half-life for Volatility Regime Adjustment	42 days
	Linked Specific Risk available	Yes
Industry Allocation Scheme	Multiple-industry allocation (up to five industries)	
Source of Industry Scheme	Based on Global Industry Classification Standard (GICS®)	
Model Base Currency	USD	

Style Factors	Purpose	Descriptors
Beta	Captures the market risk that cannot be explained by the US Country factor	<ul style="list-style-type: none"> Historical beta
Dividend Yield	Explains the return component attributable to a	<ul style="list-style-type: none"> Analyst-predicted dividend-to-price ratio

Style Factors	Purpose	Descriptors
	stock's dividend-to-price ratio and can be an indicator of earnings	<ul style="list-style-type: none"> Dividend-to-price ratio
Downside Risk	Captures the stock's sensitivity to downside market risk	<ul style="list-style-type: none"> Hybrid tail covariance risk Idiosyncratic hybrid tail covariance risk Idiosyncratic lower partial moment Lower partial moment Mean lower partial moment CAPM beta
Earnings Quality	Captures differences in persistence of company earnings and uncertainty around company earnings	<ul style="list-style-type: none"> Accruals - Balance Sheet Version Accruals - Cash-flow Statement Version Variability in sales Variability in earnings Variability in cash-flows Standard deviation of analyst prediction to price
Earnings Yield	Describes return differences based on a company's earnings relative to its price	<ul style="list-style-type: none"> Enterprise Multiple (EBITDA to EV) Trailing earnings-to-price ratio² Analyst-predicted earnings-to-price ratio³
Growth	Describes return differences of stocks based on their prospects for sales or earnings growth	<ul style="list-style-type: none"> Long term analyst-predicted growth Historical sales per share growth rate Historical earnings per share growth rate
Industry Momentum	Explains the return differences of stocks based on the performance relative to their GICS® sub-industry over the trailing six months	<ul style="list-style-type: none"> Industry momentum
Leverage	Captures the return differences between high-leverage and low-leverage stocks	<ul style="list-style-type: none"> Book leverage Debt-to-assets ratio Market leverage
Liquidity	Describes the return differences of stocks based on their relative trading activity	<ul style="list-style-type: none"> Monthly share turnover Quarterly share turnover

² REITs use FFO to Price instead of Earnings-to-Price where available

³ Combines daily and monthly descriptors

Style Factors	Purpose	Descriptors
		<ul style="list-style-type: none"> Annual share turnover Modified Amihud illiquidity measure Pastor-Stambaugh illiquidity measure
Long-Term Reversal	Explains the return differences of stocks based on their reversal pattern over the last two years	<ul style="list-style-type: none"> Long-term relative strength Long-term historical alpha
Management Quality	Measures the tendency of management to pursue 'empire' building and overinvest and management views on when stock is over/under-priced	<ul style="list-style-type: none"> Asset growth Issuance growth Capital expenditure growth Capital expenditure
Mid Capitalization	Captures the returns of mid-cap stocks relative to large- and small-cap stocks	<ul style="list-style-type: none"> Cube of size exposure
Momentum	Explains the return differences of stocks based on their relative performance over the trailing 6-12 months	<ul style="list-style-type: none"> Relative strength
Profitability	Measures profitability and operating efficiency of a company	<ul style="list-style-type: none"> Asset turnover Gross profitability Gross margin Return on assets Return on equity
Prospect	Captures risk related to stocks that have exhibited lottery-like behavior using a combination of stock return skewness over a long horizon and tail returns over the recent period	<ul style="list-style-type: none"> Skewness Maximum drawdown
Regional Momentum	Captures momentum in stock-regional performance	<ul style="list-style-type: none"> Regional momentum
Residual Volatility	Explains returns associated with high-volatility stocks that are not captured by the beta factor	<ul style="list-style-type: none"> Historical sigma Volatility implied by call options 1 month Volatility implied by put options 1 month Volatility implied by call options 3 month Volatility implied by put options 3 month

Style Factors	Purpose	Descriptors
Sentiment	Explains the return differences between stocks based on sell-side analyst revisions and news sentiment	<ul style="list-style-type: none"> • Revision ratio • Change in analyst-predicted earnings-to-price • Change in analyst-predicted earnings per share • Positive sentiment based on Composite Sentiment Score • Positive sentiment based on Event Sentiment Score • Sentiment Dispersion based on Composite Sentiment Score • At-the-money skew
Short Interest	Explains return differences of stocks based on short interest as a percent of total available to short	<ul style="list-style-type: none"> • Short interest
Size	Captures the return differences between large-cap stocks and small-cap stocks	<ul style="list-style-type: none"> • Log of market capitalization
Value	Captures the extent to which a company is overpriced or underpriced	<ul style="list-style-type: none"> • Book-to-price ratio • Sales-to-price ratio • Cash-flow to price ratio • Structural value

Industry Factors

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| 1. Aerospace and Defense | 31. Household Durables (non-Homebuilding) |
| 2. Airlines | 32. Industrial Conglomerates |
| 3. Aluminum Steel | 33. Industrial Machinery |
| 4. Apparel and Textiles | 34. Insurance Brokers and Reinsurance |
| 5. Automobiles and Components | 35. Internet and Catalog Retail |
| 6. Banks | 36. Internet Software and IT Services |
| 7. Beverages Tobacco | 37. Leisure Products Textiles Apparel and Luxury |
| 8. Biotechnology Life Sciences | 38. Life Health and Multi-line Insurance |
| 9. Building Products | 39. Managed Health Care |
| 10. Chemicals | 40. Media |
| 11. Commercial and Professional Services | 41. Multi-Utilities Water Utilities Power |

Industry Factors

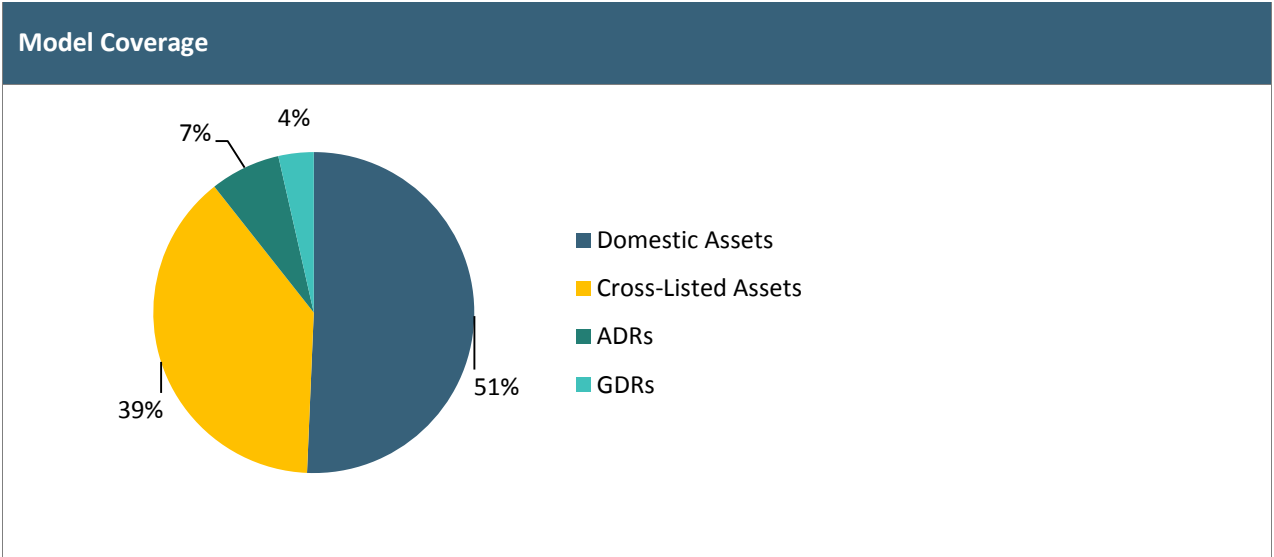
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|--|--|
| 12. Communications Equipment | 42. Oil and Gas Drilling |
| 13. Computers Electronics | 43. Oil and Gas Equipment and Services |
| 14. Construction and Engineering | 44. Oil and Gas Exploration and Production |
| 15. Construction and Farm Machinery | 45. Oil Gas and Consumable Fuels |
| 16. Construction Materials | 46. Paper and Forest Products |
| 17. Containers and Packaging | 47. Pharmaceuticals |
| 18. Distributors Multiline Retail | 48. Precious Metals Gold Mining |
| 19. Diversified Financials | 49. Real Estate |
| 20. Diversified Telecommunication Services | 50. Restaurants |
| 21. Electric Utilities | 51. Road and Rail |
| 22. Electrical Equipment | 52. Semiconductor Equipment |
| 23. Food and Staples Retailing | 53. Semiconductors |
| 24. Food Products | 54. Software |
| 25. Gas Utilities | 55. Specialty Chemicals |
| 26. Health Care Equipment and Technology | 56. Specialty Retail |
| 27. Health Care Providers (non-HMO) | 57. Specialty Stores |
| 28. Homebuilding | 58. Trading Companies and Distributors |
| 29. Hotels Leisure and Consumer Services | 59. Transportation Air Freight and Marine |
| 30. Household and Personal Products | 60. Wireless Telecommunication Services |

Country Factors

US Country

Model Coverage

- Total 19800+ assets as of 29 May 2015
 - +10000 domestic stocks, including +5700 OTC listings
 - From NYSE, NASDAQ, and American Stock Exchange. Also includes Pink Sheets and OTC markets
 - The model also covers over 370 ETFs



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