

Datasheet - Barra US Total Market Equity Trading Model

March 2015

Model Summary

Asset Coverage: 19700+

Style Factors: 24

Industry Factors: 60

Market Factor: 1

Model Advances

- Alignment of the factor structure with a daily horizon for more accurate risk forecast
- Style factors that reflect the latest research on Systematic Equity Strategies to capture new sources of investment risk. Introduces new factors based on Sentiment, Downside Risk, Industry Momentum, Regional Momentum, Short Interest, 1-day Reversal, Seasonality, and Short-Term Reversal.
- 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
- Implied Volatility Adjustment leverages option-implied volatility to improve risk forecasts and reflect market events in a timely fashion
- Robust specific risk model based on daily asset-level returns, incorporating Volatility Regime Adjustment, Implied Volatility Adjustment, and Bayesian Adjustment techniques for greater forecasting accuracy
- Full daily history and updates

| 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 for Volatility 42 days |
| | Newey-West Volatility Lags 0 |
| | Half-life for Correlations 200 days |
| | Newey-West Correlation Lags 0 |
| | Half-life for Volatility Regime Adjustment 21 days |
| Specific Risk | Half-life for Specific Volatility 42 days |
| | Newey-West Auto-Correlation Lags 0 |
| | Newey-West Auto-Correlation Half-Life 252 days |
| | Bayesian Shrinkage Parameter 0.05 |
| | Half-life for Volatility Regime Adjustment 4 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 |
|----------------|---|---|
| 1-day Reversal | Explains the return differences of stocks based on their reversal pattern over the last day | <ul style="list-style-type: none"> 1-day reversal |
| Beta | Captures the market risk that cannot be | <ul style="list-style-type: none"> Historical beta |

| Style Factors | Purpose | Descriptors |
|------------------------------------|--|---|
| explained by the US Country factor | | |
| Dividend Yield | Explains the return component attributable to a stock's dividend-to-price ratio and can be an indicator of earnings | <ul style="list-style-type: none"> Analyst-predicted dividend-to-price ratio 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 | Measures return differences of stocks based on the cash and 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 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 ratio¹ Analyst-predicted earnings-to-price ratio² |
| 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 |

¹ REITs use FFO to Price instead of Earnings-to-Price where available

² Combines daily and monthly descriptors

| Style Factors | Purpose | Descriptors |
|---------------------|--|--|
| 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 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 | A combination of asset, investment, net issuance growth measures that captures common variation in stock returns of companies experiencing rapid growth or contraction of assets. | <ul style="list-style-type: none"> Asset growth Issuance growth Capital expenditure growth Capital expenditure |
| Mid Capitalization | Captures the return differences between mid-cap stocks versus small- and large-cap stocks | <ul style="list-style-type: none"> Cube of size exposure |
| Momentum | Explains common variation in stock returns related to recent stock price behavior | <ul style="list-style-type: none"> Relative strength |
| Profitability | A combination of profitability measures of a firm's operations and total activities | <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 1 month (at-the-money) call option Volatility implied by 1 month put option Volatility implied by 3 month (at-the- |

| Style Factors | Purpose | Descriptors |
|---------------------|---|---|
| | | <ul style="list-style-type: none"> money) call option Volatility implied by 3 month put option |
| Seasonality | Captures stocks' seasonal outperformance by looking at the next month's past 5 years performance against the market | <ul style="list-style-type: none"> Seasonality |
| 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 Event Sentiment Score Positive sentiment based on Composite 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 |
| Short-Term Reversal | Explains the return differences of stocks based on their reversal pattern over the trailing month | <ul style="list-style-type: none"> Short-term reversal |
| 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

- | | |
|---------------------------------------|-----------------------------------|
| 1. Oil and Gas Drilling | 31. Distributors Multiline Retail |
| 2. Oil and Gas Equipment and Services | 32. Internet and Catalog Retail |

Industry Factors

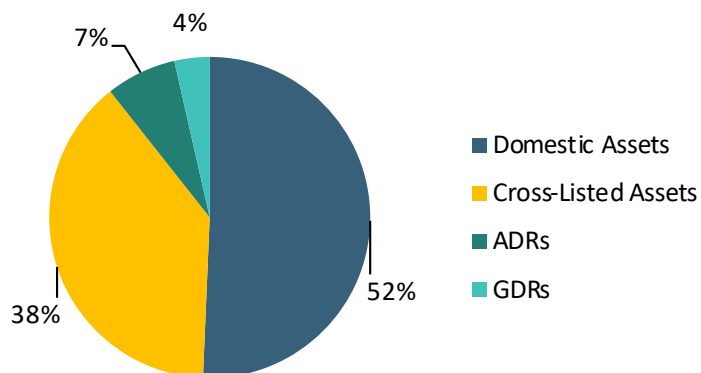
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| 3. Oil and Gas Exploration and Production | 33. Apparel and Textiles |
| 4. Oil Gas and Consumable Fuels | 34. Specialty Stores |
| 5. Chemicals | 35. Specialty Retail |
| 6. Specialty Chemicals | 36. Household and Personal Products |
| 7. Construction Materials | 37. Food and Staples Retailing |
| 8. Containers and Packaging | 38. Food Products |
| 9. Paper and Forest Products | 39. Beverages Tobacco |
| 10. Aluminum Steel | 40. Health Care Equipment and Technology |
| 11. Precious Metals Gold Mining | 41. Managed Health Care |
| 12. Aerospace and Defense | 42. Health Care Providers (non-HMO) |
| 13. Construction and Farm Machinery | 43. Biotechnology Life Sciences |
| 14. Industrial Machinery | 44. Pharmaceuticals |
| 15. Building Products | 45. Banks |
| 16. Trading Companies and Distributors | 46. Diversified Financials |
| 17. Construction and Engineering | 47. Life Health and Multi-line Insurance |
| 18. Electrical Equipment | 48. Insurance Brokers and Reinsurance |
| 19. Industrial Conglomerates | 49. Real Estate |
| 20. Commercial and Professional Services | 50. Semiconductor Equipment |
| 21. Airlines | 51. Semiconductors |
| 22. Transportation Air Freight and Marine | 52. Internet Software and IT Services |
| 23. Road and Rail | 53. Software |
| 24. Automobiles and Components | 54. Communications Equipment |
| 25. Household Durables (non-Homebuilding) | 55. Computers Electronics |
| 26. Homebuilding | 56. Diversified Telecommunication Services |
| 27. Leisure Products Textiles Apparel and Luxury | 57. Wireless Telecommunication Services |
| 28. Hotels Leisure and Consumer Services | 58. Electric Utilities |
| 29. Restaurants | 59. Gas Utilities |
| 30. Media | 60. Multi-Utilities Water Utilities Power |

Market Factor

US Country

Model Coverage

- Total 19700+ assets as of 31 Jul 2014
 - +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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