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Identifying the Sector Opportunity Set

Figure 1
Macroeconomic Variables

How Macroeconomic Variables Impact Sector Performance

Macroeconomic variables like inflation, monetary policy, GDP growth, and commodity prices are important in explaining asset class performance and style premia — academic studies confirm it. The more directly the macroeconomic environment or specific economic variables affect a sector's operating environment and financial results, the greater the impact on that sector's performance. For example, oil prices directly affect the revenue, profitability, and asset value of Oil & Gas Explorers and Producers. And, interest rates movements are one of key drivers of Banks' net interest margins.¹

The goal of our research here is to identify sectors and industries that have greater performance sensitivity to specific macroeconomic variables. This gives investors a starting point for the kind of top-down sector analysis that can help guide investment decisions.

Certain sub-sectors or industries may exhibit greater sensitivity to macroeconomic variables than the broad sector. Our analysis of the 11 GICS sectors and 18 industries (see Appendix I) identifies this specific opportunity set for investors.

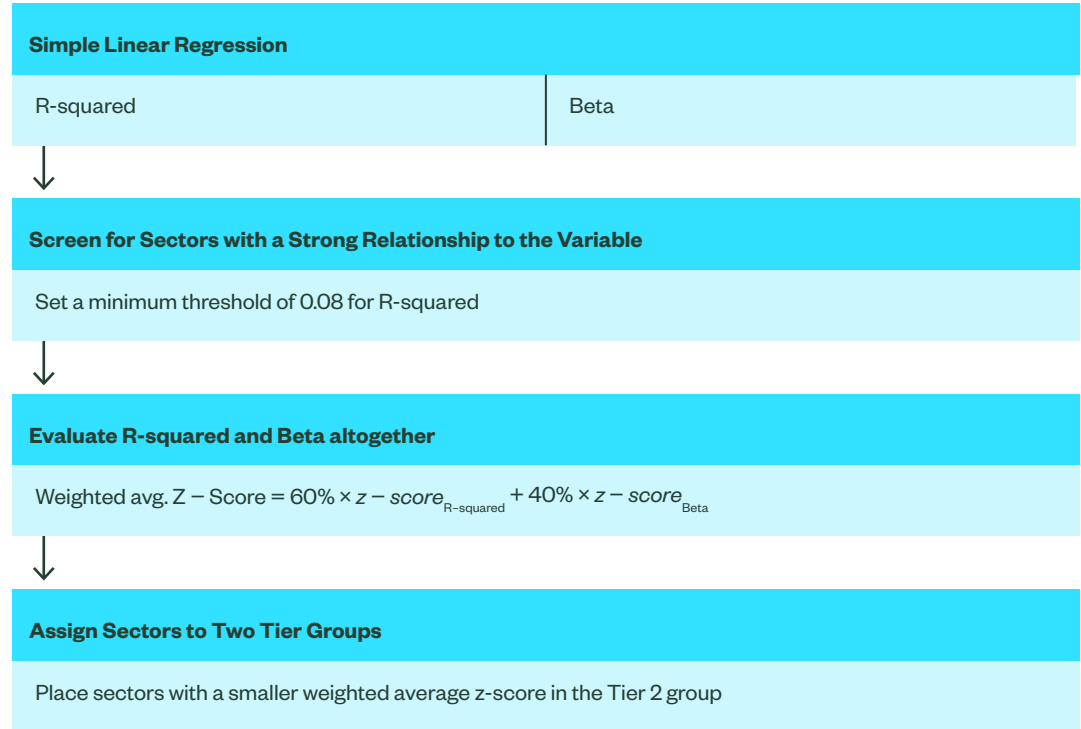
We focused on a few key indicators broadly recognized to be influencers of asset class performance, as shown in Figure 1. Then, we selected sample time periods based on the availability of historical sector performance data (starting from July 2003) or the full cycle of yield changes.

Macroeconomic Variables	Time Period
10-Year Treasury Yield (% Level Change)	January 2018–December 2022, which is a full cycle of 10-year decline from 3% and rebound to 4%
10-Year Breakeven Rate (Proxy for Inflation Expectation, % Level Change)	July 2003–December 2022
US Dollar Index (% Price Change)	July 2003–December 2022
WTI Crude Oil Prices (% Price Change)	July 2003–December 2022

Source: State Street Global Advisors, SPDR Americas Research, as of August 2023. Past performance is not a reliable indicator of future performance.

Figure 2

The Approach to Identify Sectors Highly Sensitive to Macro Variables



Source: State Street Global Advisors, SPDR Americas Research, as of August 2023.

A simple linear regression model evaluates:

1. The strength of the relationship between sectors' relative returns and specific macroeconomic variables, as measured by R-squared of the regression model.
2. The significance of the impact, as measured by the coefficient of the variable, commonly known as beta.

Focusing on relative returns removes effects of market beta on sector performance and transforms the time series to a stationary data set for regression analysis. We also tested the significance of coefficient (t-test), autocorrelation, and normality of the error distribution from the regression model to ensure coefficient estimates are reliable and statistically different from zero.

Defining Strong Relationships Between Sectors and Macro Variables

With so many unmeasured variables that can impact sector performance and all the noise in macroeconomic data, identifying a single macroeconomic variable that can explain even a small portion of sector performance gives investors valuable information.

To uncover that information edge, we set a minimum threshold of 0.08 for R-squared to screen for sectors with a strong relationship to the variable. What that means is if the macroeconomic variable can explain more than 8% of the variance of sector returns, we consider the relationship between the variable and the sector to be strong.

Evaluating the Magnitude of Impact

The magnitude of the impact of macroeconomic variables, measured by beta, is also worth review. For example, both Metals & Mining and Capital Markets industries have exhibited strong negative correlation with the US dollar (USD). However, beta for the Metals & Mining is much greater than for the Capital Markets industries. In other words, a 1% depreciation of the USD may provide more tailwinds for Metals & Mining than for Capital Markets.

To evaluate R-squared and beta altogether, we calculate weighted average z-score of R-squared and beta for sectors that passed the previous screen under each macroeconomic variable. We gave R-squared a greater weight (60%) in the z-score, since the strength of the relationship is a prerequisite to consider sectors for positioning against macroeconomic variables.

What is a z-score?

Z-score measures how many standard deviations an element is above or below the population mean. A sector z-score can be calculated from the following formula. $Z = (X - \mu) / \sigma$, where X is the sector value of the metrics, μ is the mean of 11 sector values for a certain metric, and σ is the standard deviation of the value of 11 sectors.

There is one caveat to the sector beta estimates, which led us to group sectors that passed the initial screen into two tiers based on the weighted average z-score, instead of directly ranking them. While the beta for some sectors is statistically different from zero, their 95% confidence intervals — or the range of the beta that covers the true value 95% of the time — are quite wide and sometimes overlap with each other (see Appendix II). We placed sectors with a smaller weighted average z-score in the Tier 2 group.

See Appendix II for R-squared, beta, and z-scores of listed sectors. Sectors identified as having a strong relationship to macro variables are listed in Figure 3.

Figure 3
Sectors With Strong Relationships to Macro Variables

		10-Year Yield	10-Year Breakeven	USD	Oil
Positive	Tier 1	Insurance [^] Oil & Gas Equipment & Services, Energy Financials, Banks, Regional Banks	Oil & Gas Equipment & Services; Metals & Mining	Cons. Staples	Oil & Gas Equipment & Services Oil & Gas Exploration & Production Energy
	Tier 2	Oil & Gas Exploration & Production Industrials [^]	Oil & Gas Exploration & Production*		Metals & Mining
Negative	Tier 1	Communication Services	Cons. Staples Health Care	Metals & Mining; Materials Oil & Gas Equipment & Services	Health Care Cons. Staples Utilities ^{**^}
	Tier 2	Tech [^]		Capital Markets*	

Source: State Street Global Advisors, SPDR Americas Research, as of December 2022. **Past performance is not a reliable indicator of future performance.** * R-squared is greater than 0.08 and less than 0.1. **Sectors that didn't show strong correlation for the sample periods when the macroeconomic variable had a greater than one standard deviation move.

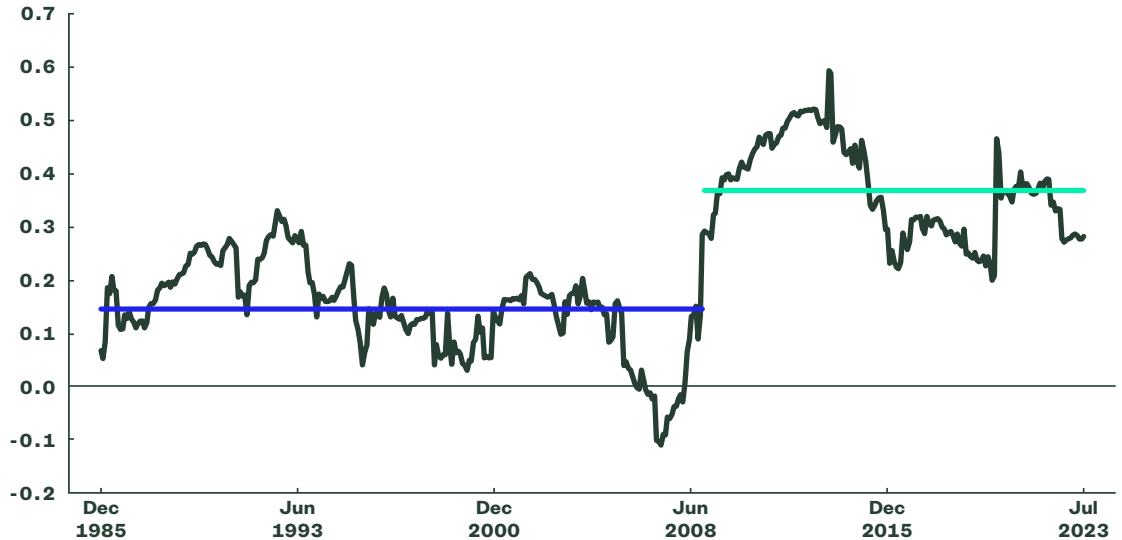
Macro Variables' Impact on Sectors Aligns with Intuition

Our findings on how macro variables impact sectors are generally in line with economic intuition.

- **Commodities related sectors**, such as Oil & Gas industries and Metals & Mining are most sensitive to oil prices and the USD, since the two variables directly impact commodity prices. These sectors are also positively correlated to inflation expectations, as higher commodity prices tend to lift inflation expectations and increase the sectors' profits.
- **Cyclical industries like Financials and Energy** tend to move with 10-year yields, as higher 10-year yields generally point to strength in economic growth. Energy's high sensitivity to 10-year yields is more likely driven by the high correlation between 10-year yields and oil prices since 2009, as shown in the chart below.
- **Communication Services and Tech** have negative correlation to 10-year yields that can be explained by their growth-oriented, long-duration profile, as higher risk-free rates weigh more on growth stock valuations.
- **Defensive sectors like Health Care and Consumer Staples** tend to outperform amid lower oil prices, declining inflation expectations, and a stronger USD, resulting from a weaker economic outlook and risk-off sentiment.

Figure 4
5-Year Rolling Correlation of Oil Monthly Return and 10-Year Yield Changes

■ Correlation
■ Avg. Since January 2009
■ Avg. 1986–2008



Source: FactSet, for the period from December 1981 to July 2023. **Past performance is not a reliable indicator of future performance.**

Gauging Sector Sensitivity to Macroeconomic Shocks

To find out whether relationships between sectors and macroeconomic variables would be strengthened or weakened by dramatic changes in variables, we divided the data sample into two groups based on the macroeconomic variable's deviation from its historical average. If the variable is more than one standard deviation away from the average, we consider the change to be dramatic.

The table below shows the R-squared of the simple linear regression between sectors and each macroeconomic variable in the two data groups. Most sectors show stronger correlation to the variable when there are more dramatic changes to the variable.

On the other hand, when changes are within one standard deviation, R-squared of all sectors (except for Energy industries in relation to oil prices) declined below the minimum threshold of 0.08. This indicates an insignificant linear relationship when movements in macroeconomic variables are less significant.

Figure 5
Sector Sensitivity During
Macroeconomic Shocks

		Between 1stdv R Sqr	Greater than 1 Stdv R Sqr
10-Year Breakeven			
Monthly Level Change Since 07/01/2003	Oil & Gas Equipment & Services	0.054	0.285
	Metals and Mining	0.030	0.379
	Oil & Gas Exploration & Production	0.060	0.120
	Health Care	0.033	0.171
	Cons. Staples	0.018	0.214
USD			
Weekly Return Since 01/01/2000	Metals and Mining	0.047	0.496
	Cons. Staples	0.011	0.363
	Materials	0.028	0.283
	Oil & Gas Equipment & Services	0.052	0.343
	Capital Markets	0.000	0.393
Oil			
Weekly Return Since 01/01/2000	Oil & Gas Equipment & Services	0.196	0.447
	Oil & Gas Exploration & Production	0.184	0.459
	Energy	0.143	0.402
	Metals and Mining	0.047	0.273
	Health Care	0.028	0.109
	Cons. Staples	0.029	0.108
	Utilities	0.005	0.028
10-Year Treasury Yield			
Monthly Level Change Since 07/01/2003	Insurance	0.001	0.001
	Oil & Gas Equipment & Services	0.024	0.190
	Financials	0.012	0.113
	Energy	0.019	0.123
	Regional Banks	0.030	0.108
	Bank	0.040	0.228
	Oil & Gas Exploration & Production	0.038	0.141
	Comm Svs.	0.041	0.117
	Industrials	0.003	0.050
	Tech.	0.002	0.000

Source: State Street Global Advisors, SPDR Americas Research, as of December 2022. R-squared greater than 0.08 is highlighted in green. **Past performance is not a reliable indicator of future performance.**

Charting the Yield Curve's Impact on Sectors

The slope of the yield curve has been closely watched by investors and monetary policymakers to project the future state of the economy. Monetary policy has a significant influence on the yield curve spread, economic activity, and short-term equity market performance.

Expectations of future inflation and monetary policy contained in the yield curve spread also influence forecasts for economic growth, which in turn influence stock prices. The yield spread of 10- and 2-year Treasuries is used as a proxy for the slope of the yield curve. Widening yield spreads indicate a steepening yield curve, while tightening spreads indicate a flattening yield curve.

We first conducted the Chi Square Test for Independence to determine if there is a significant relationship between the types of yield curve change (steepening or flattening) and sector performance (under/outperform the market). This helped us narrow our focus for further analyzing impact down to these nine sectors: Banks, Regional Banks, Capital Markets, Oil & Gas Equipment & Services, Software & Services, Consumer Staples, Financials, Real Estate, and Utilities.

We broke down the yield curve changes into six categories based on the direction and relative level of changes in 10-year and 2-year yields and created five dummy variables $X_1 \sim X_5 = (0,1)$ to represent each type of yield curve in multiple linear regression analysis, as shown in Figure 6.

The intercept of the regression model (β_0) is interpreted as the average relative return when the yield curve is bear steepening. $\beta_0 + \beta_1, \beta_0 + \beta_2, \dots, \beta_0 + \beta_5$ are the mean estimate of relative returns given other five types of curve changes.

Figure 6
Yield Curve Multiple Regression Model and Types of Yield Curve Change

$$\text{Sector Relative Return} = \beta_0 + \beta_1 \times X_1 + \beta_2 \times X_2 + \beta_3 \times X_3 + \beta_4 \times X_4 + \beta_5 \times X_5$$

Yield Curve Change	Definition	Variables and Coefficient	Mean Estimate of Relative Return	No. of Months in the Data Sample (Since July 2003)
Bear Steepen	10-year yield increase > 2-year yield increase	Intercept, β_0	β_0	52
Bear Flatten	10-year yield increase < 2-year yield increase	X_1, β_1	$\beta_0 + \beta_1$	49
Bull Steepen	10-year yield decrease < 2-year yield decrease	X_2, β_2	$\beta_0 + \beta_2$	22
Bull Flatten	10-year yield decrease > 2-year yield decrease	X_3, β_3	$\beta_0 + \beta_3$	72
Twist Flatten	10-year yield decrease, 2-year yield increase	X_4, β_4	$\beta_0 + \beta_4$	20
Twist Steepen	10-year yield increase, 2-year yield decrease	X_5, β_5	$\beta_0 + \beta_5$	19

Source: State Street Global Advisors, SPDR Americas Research, as of December 2022. **Past performance is not a reliable indicator of future performance.**

Linear regression models for Banks, Regional Banks, Real Estate, and Utilities show an adjusted R-squared greater than 0.08, indicating yield curve movements have significant explanation power for these sectors' returns.

The table below shows the mean estimate of relative returns for various yield curve changes. The estimates that passed the significance test of coefficient (t-test) are highlighted in green. However, estimates for Bull Steepen, Twist Flatten, and Twist Steepen types of the yield curve should be taken with a grain of salt, since there are only about 20 observations under each of those scenarios in our data sample.

Figure 7
Estimated Mean of Relative Sector Returns (%)

	Bear Flatten	Bear Steepen	Bull Flatten	Bull Steepen	Twist Flatten	Twist Steepen
Banks	-0.404	1.846	-1.914	0.686	-0.574	-1.244
Regional Banks	-0.385	1.956	-1.785	0.465	0.235	-1.126
Real Estate	-0.463	-2.090	1.783	-0.036	-1.871	-0.369
Utilities	-0.125	-2.200	1.278	0.158	-1.597	-0.417

Source: State Street Global Advisors, SPDR Americas Research, as of December 2022. **Past performance is not a reliable indicator of future performance.**

This analysis of the yield curve's impact on sectors is consistent with expectations:

- **Banks** Since banks borrow at short-term rates and lend at long-term rates, a steepening yield curve generally provides tailwinds for banks' profits, while a flattening curve means headwinds. Under the bear steepening scenario, higher rates on both the long and short end of the curve indicate that tightening monetary policies are not expected to hinder positive growth prospects, which further support demand for credits and bank revenue growth.
- **Utilities and Real Estate** Low Treasury yields also make Utilities' and Real Estate's high dividend income more attractive to investors. Lower yields also generally point to a weaker economic growth outlook and risk-off market sentiment, which favor high dividend defensive stocks in Utilities and Real Estate.

Figure 8
Summary of Yield Curve's Impact on Sectors

	Bear Flatten (10-year Yield Increase < 2-year Yield Increase)	Bear Steepen (10-year Yield Increase > 2-year Yield Increase)	Bull Flatten (10-year Yield Decrease > 2-year Yield Decrease)
Positive		Bank; Regional Bank	Real Estate; Utilities
Negative	Bank; Regional Bank; Real Estate; Utilities	Real Estate; Utilities	Bank; Regional Bank

Source: State Street Global Advisors, SPDR Americas Research, as of December 2022. **Past performance is not a reliable indicator of future performance.**

Sector Performance Influenced by Additional Variables

While this research focused on the impacts of a short list of macroeconomic variables, we acknowledge that sector performance is influenced by many variables beyond the ones analyzed. This includes other economic variables, industry-specific secular trends, valuations, monetary policy, and short-term market sentiment.

Given the complexity and interactive nature of economic variables, it's difficult both to anticipate which variables will drive sector returns and also to judge whether the macro expectations are priced in. Rather than predict sector performance using these variables, this research helps investors understand which sector relationships with macroeconomic variables appear most meaningful over a nearly 20-year period.

Due to the limitation of linear regression models, this research identifies only sectors that have strong linear relationships with the macro variables. Sectors may have more complicated relationships that require a non-linear model to formulate. Of course, a more complicated non-linear approach would come at the expense of an easily understood and interpretable model.

Rather than use this research alone to predict sector performance or provide sector rotation trading signals, investors should use it together with sector fundamental analysis and our sector business cycle framework, to evaluate the merits of investing in certain sectors under specific economic conditions.

Appendices

Appendix I: List of Sectors

List of Sectors	Indices	Earliest Available Data
Banks	S&P Bank Select Industry Index	Jul 2003
Regional Banks	S&P Regional Banks Select Industry Index	Jul 2003
Capital Markets	S&P Capital Markets Select Industry Index	Jul 2003
Insurance	S&P Insurance Select Industry Index	Jul 2003
Aerospace & Defense	S&P Aerospace & Defense Select Industry Index	Jan 2000
Transportation	S&P Transportation Select Industry Index	Jan 2000
Biotechnology	S&P Biotechnology Select Industry Index	Jan 2000
Pharmaceuticals	S&P Pharmaceuticals Select Industry Index	Jan 2000
Healthcare Equipment	S&P Healthcare Equipment Select Industry Index	Jan 2000
Health Care Services	S&P Health Care Services Select Industry Index	Jan 2000
Oil & Gas Exploration & Production	S&P Oil & Gas Exploration & Production Select Industry Index	Jan 2000
Oil & Gas Equipment	S&P Oil & Gas Equipment Select Industry Index	Jan 2000
Metals and Mining	S&P Metals and Mining Select Industry Index	Jan 2000
Retail	S&P Retail Select Industry Index	Jan 2000
Homebuilders	S&P Homebuilders Select Industry Index	Jan 2000
Semiconductors	S&P Semiconductors Select Industry Index	Jan 2000
Software & Service	S&P Software & Service Select Industry Index	Jul 2003
Telecom	S&P Telecom Select Industry Index	Jan 2000
Cons. Disc.	S&P 500 Consumer Discretionary Index	Sep 1989
Cons. Staples	S&P 500 Consumer Staples Index	Sep 1989
Energy	S&P 500 Energy Index	Sep 1989
Financials	S&P 500 Financials Index	Sep 1989
Health Care	S&P 500 Health Care Index	Sep 1989
Industrials	S&P 500 Industrials Index	Sep 1989
Tech.	S&P 500 Information Technology Index	Sep 1989
Materials	S&P 500 Materials Index	Sep 1989
Comm Services.	S&P 500 Communication Services Index	Sep 1989
Real Estate	S&P 500 Real Estate Index	Sep 1989
Utilities	S&P 500 Utilities Index	Sep 1989

Source: State Street Global Advisors, SPDR Americas Research, as of August 2023.

Appendices

Appendix II: Simple Linear Regression Results and Z-score of Sectors Highly Sensitive to Macroeconomic Variables

		Beta 95% Confidence Interval				
		R-Squared	Beta	Lower Bound	Upper Bound	Weighted Avg. Z-Score
10-Year Breakeven	Oil & Gas Equipment & Services	0.13	23.71	11.90	26.80	1.15
	Metals and Mining	0.13	19.95	13.13	26.77	0.84
	Oil & Gas Exploration & Production	0.09	18.60	6.71	21.43	-0.26
	Health Care	0.09	-5.72	-8.14	-3.30	-0.83
	Cons. Staples	0.08	-5.94	-8.50	-3.39	-0.91
USD	Metals and Mining	0.21	-2.12	-2.53	-1.51	0.65
	Cons. Staples	0.15	0.65	0.44	0.85	0.43
	Materials	0.17	-0.67	-0.85	-0.46	0.38
	Oil & Gas Equipment & Services	0.12	-1.84	-2.13	-0.94	-0.71
	Capital Markets	0.09	-0.60	-0.83	-0.35	-0.75
Oil	Oil & Gas Equipment & Services	0.44	0.65	0.52	0.71	1.35
	Oil & Gas Exploration & Production	0.41	0.57	0.48	0.66	1.13
	Energy	0.30	0.34	0.24	0.37	0.42
	Metals and Mining	0.17	0.37	0.26	0.48	-0.14
	Health Care	0.11	-0.10	-0.14	-0.06	-0.85
	Cons. Staples	0.10	-0.10	-0.14	-0.07	-0.89
	Utilities	0.08	-0.14	-0.20	-0.08	-1.02
10-Year Treasury Yield	Insurance	0.24	7.47	4.01	10.94	1.23
	Oil & Gas Equipment & Services	0.17	24.86	10.28	39.43	0.59
	Financials	0.20	6.08	2.90	9.25	0.54
	Energy	0.17	15.97	6.85	25.10	0.42
	Regional Banks	0.18	11.20	4.91	17.48	0.35
	Bank	0.18	10.24	4.52	15.96	0.34
	Oil & Gas Exploration & Production	0.11	17.46	4.37	29.94	-0.55
	Comm Svs.	0.15	-4.77	-7.73	-1.81	-0.61
	Industrials	0.11	3.68	0.90	6.46	-1.03
	Tech.	0.11	-3.66	-6.42	-0.91	-1.26

Source: State Street Global Advisors, SPDR Americas Research, as of December 2022. **Past performance is not a reliable indicator of future performance.** Red shades highlight sectors with negative correlation with the macroeconomic variable.

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Endnote

1 Net interest margin movement throughout recent rate cycles, Federal Reserve Bank of Kansas City, November 2022.

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* Pensions & Investments Research Center, as of December 31, 2022.

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Glossary

Z-score Measures how many standard deviations an element is above or below the population mean. A sector z-score can be calculated from the following formula. $z = (X - \mu) / \sigma$, where X is the sector value of the metrics, μ is the mean of 11 sector values for a certain metric, and σ is the standard deviation of the value of 11 sectors.

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