

# Identifying Risks — and Revealing Opportunities — Sector by Sector

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## First Up: Information Technology

In this series of articles, we dig deep into the risk characteristics of—and investment opportunities provided by—a number of macroeconomic sectors. Our aim is to help risk model users better understand risk from a sector perspective. The information should be helpful to risk managers, especially at fundamental shops, as well as portfolio managers (PMs) with a sector focus. Even PMs who don't build their portfolios sector by sector should find the analysis useful, as it shows how Technology stocks interact with other parts of the portfolio and how returns in that sector may differ from those in other sectors.

We begin by focusing on large-cap US stocks, drawing our sector information from the Russell 1000. We have created monthly portfolios starting in 1991 by screening the Russell 1000 for all stocks in a given sector on a monthly basis and weighted the stocks using Russell's weights. For each sector, we have calculated numerous risk-related statistics, including risk levels, factor exposures, contributions to variance and intra-sector correlations. We also looked at valuation levels, performance data and inter-sector correlations. Finally, we used Axioma's Risk Model Machine to create sector-specific models, with the main goal of looking at the performance of various risk and return factors within the sector. Our plan is to drill down into each sector, providing comparisons with other sectors where appropriate.

Our first report focuses on the Information Technology sector (also referred below as "Technology" or "Tech"), which has made headlines this year as its fortunes have rebounded from some of the concerns that drove it down immediately after the US election. The sector far outpaced the index in the first four months of 2017, returning 15.1%, more than twice the 7.1% return for the Russell 1000 (**Table 1**).

**Figure 1** shows the long-term return of the Tech sector relative to the Russell 1000. Although Tech stocks have outperformed the index fairly steadily for the past 10 years, they remain well below their high water mark at the height of the Internet bubble in mid-to-late 2000. In **Figure 2** we highlight the active risk<sup>1</sup> of our Tech portfolio, which continued to climb as Tech stocks fell precipitously, peaking out in November 2001. And while the sector's total risk was consistently above that of the market before the Global Financial Crisis, the difference in risk has narrowed since the end of 2008. Finally, while some may view Technology as an inherently risky sector, it is actually the third-lowest among the 11 GICS sectors in US large cap (**Figure 3**). The Information Technology sector has also provided an attractive risk-return tradeoff this year, especially considering that the higher-risk sectors have had lower returns so far this year.

In **Figure 4** we compare the weight of the Technology sector to its contribution to benchmark risk, as well as the difference between the two. For the first 18 years of our study, Technology's contribution to benchmark risk was higher than what would have been expected based on its index weight. The gap between contribution to risk and weight peaked in August of 2000, with a risk contribution of more than 54% and a weight of 34%, also individual peaks for each. That gap is the biggest we have observed for any sector at any time, and is the kind of variable we should continue to watch. Perhaps it is a strong signal<sup>2</sup>...

## Return Characteristics

**Table 1. Sector Returns**

	YTD 2017	Jan-Apr 2016	2016	Returns for Periods Ended April 2017						
				Last 12 months	Last 3 years	Last 5 years	Last 10 years	Last 15 Years	Last 20 Years	Last 25 Years
Consumer Discretionary	11.2	1.8	6.5	16.3	13.3	16.5	10.4	9.2	9.2	9.6
Consumer Staples	13.3	4.9	9.2	17.9	13.0	14.4	9.2	9.4	10.0	10.1
Energy	-9.6	12.9	26.4	1.2	-8.8	0.7	2.1	7.7	8.2	9.6
Financials	1.9	-1.4	23.6	27.8	12.3	15.5	0.7	3.9	5.9	9.4
Health Care	10.4	-3.3	-2.8	11.0	11.2	17.3	10.2	8.6	9.5	11.1
Industrials	6.3	5.9	19.2	19.7	9.6	14.9	7.9	8.7	8.7	10.3
<b>Information Technology</b>	<b>15.1</b>	<b>-3.2</b>	<b>13.0</b>	<b>34.3</b>	<b>16.9</b>	<b>15.3</b>	<b>10.9</b>	<b>9.2</b>	<b>8.7</b>	<b>11.8</b>
Materials	7.3	9.9	18.3	15.5	6.0	10.0	6.1	8.6	7.4	8.2
Real Estate	3.4	2.8	5.3	5.9	9.1	9.3	4.4	10.1	9.5	10.0
Telecomm	-5.7	13.0	23.9	3.4	6.8	8.9	4.8	6.5	4.7	6.3
Utilities	6.9	13.2	17.0	10.6	9.7	11.9	6.3	8.4	8.5	8.6
Russell 1000	7.1	1.7	11.9	17.9	10.1	13.6	7.3	7.8	7.8	9.5

Returns are in percent, and annualized for periods of more than one year.

Source: FTSE Russell, Axioma

<sup>1</sup> We view the active risk of the portfolio as a measure of how similar or different the sector is from the overall index.

<sup>2</sup> The only other sector to experience a gap that could be considered as large was Financials in August 2008, when its weight was 13.4% but it contributed almost 25% of the index risk.

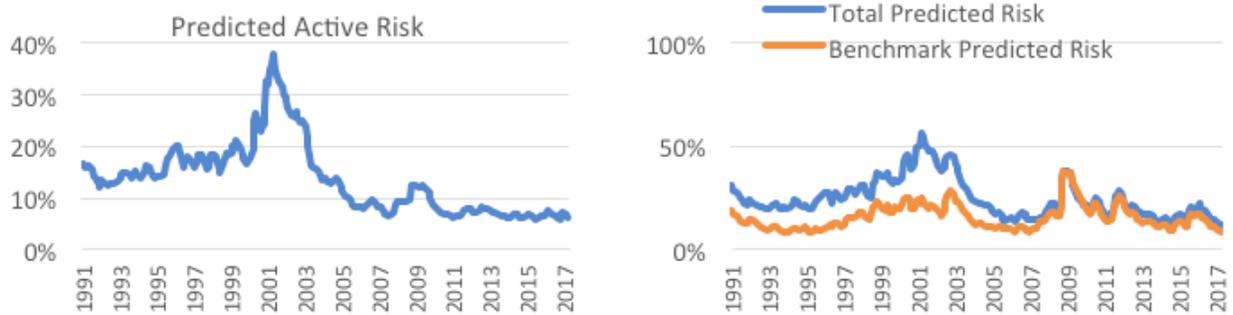
Figure 1. Relative Return, Information Technology Sector vs. Russell 1000



Source: FTSE Russell, Axioma

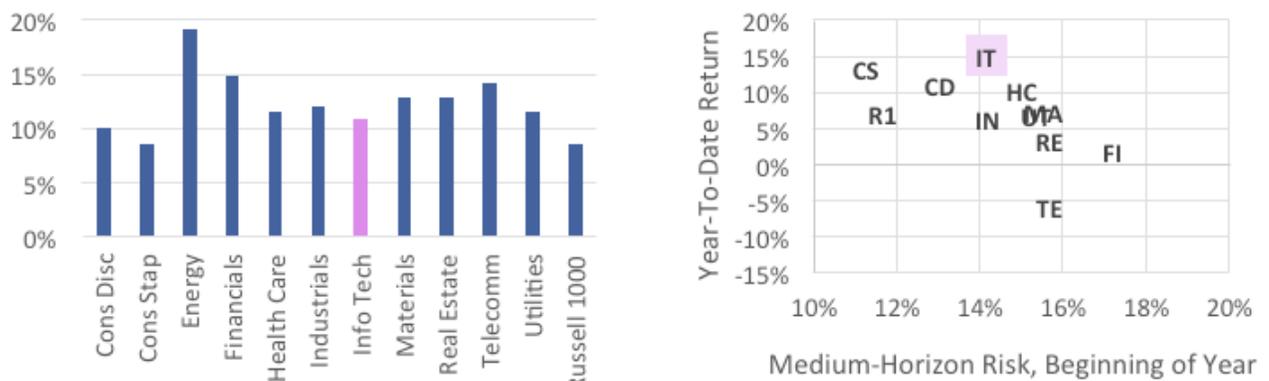
## Risk Characteristics

Figure 2. Aggregate Risk Characteristics



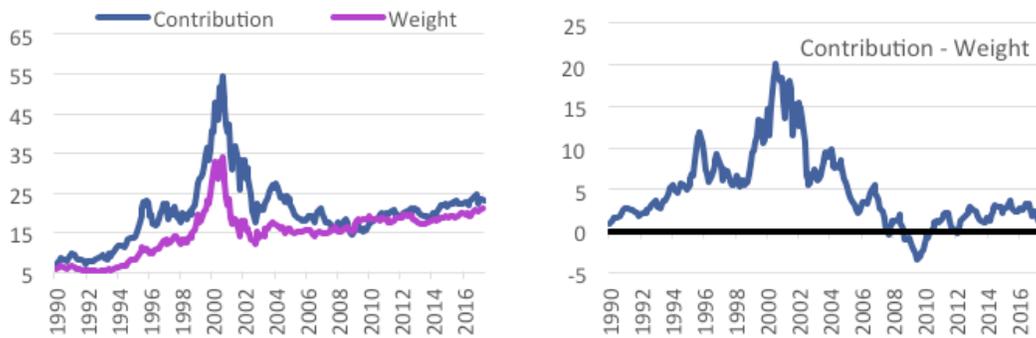
Source: FTSE Russell, Axioma

Figure 3. Current Risk Levels and Year-to-Date Return vs. Beginning of Year Risk



Source: FTSE Russell, Axioma

Figure 4. Technology Weight vs. Contribution to Medium-Horizon Risk



Source: FTSE Russell, Axioma

In **Figure 5**, we detail Information Technology’s active exposures through time to most of the risk factors in our US 4 model, to see how these factors have evolved over time, as well as how they currently rank versus exposures of other sectors. These exposures are simply the weighted average of individual stocks’ exposures.

**To summarize the analysis of the sector detailed below, “this is not your father’s Tech sector.”**

For many of the factors, Technology has one of the highest or lowest exposures among the 11 GICS sectors, and investors may want to take that into account as they construct portfolios that include Technology stocks, since the sector is likely to have a big impact on overall portfolio risk.

Some observations:

**Dividend Yield:** Technology stocks have typically been on the low end of the dividend-paying scale, and in the early 1990s there was quite a negative exposure to Dividend Yield, as compared with the rest of the market. While the exposure remains negative, it has ratcheted up quite a bit since 2005, as more than half of the companies in our portfolio pay dividends, including seven of the 10 biggest names. Still, this sector’s exposure to Dividend Yield is currently the lowest of any of the 11 GICS sectors.

**Earnings Yield:** Technology stocks also historically tended to be on the higher end of the P/E spectrum – in other words, they had lower exposures to Earnings Yield than the average stock. Since early 2009, however, the weighted-average exposure to Earnings Yield has hovered around zero, meaning that Tech stocks, on average, are no more or less pricey than other stocks in the Russell 1000, and that exposure has remained remarkably steady. In the next section, we will look at the actual relative valuation level of the sector based on trailing earnings; the Earnings Yield risk factor uses both trailing and projected earnings.

**Exchange Rate Sensitivity:** This factor measures the degree to which an individual stock is sensitive to movements in its home currency relative to a basket of currencies. A positive exposure means the company benefits as its base currency strengthens (i.e., an importer). Because the factor is calculated as a sensitivity, as stocks dropped precipitously in the early 2000s, their sensitivity to the currency may have been overstated, and therefore the exposure became quite negative. Since that time, the exposure has appeared to be much more

stable, with a slight positive bias. Most recently, Tech's Exchange Rate Sensitivity exposure has been higher than that of all sectors except Financials, but the level and rank may reverse as we roll off the period with the very strong US dollar that coincided with strong sector performance.

**Growth:** Technology stocks are often considered to be Growth stocks, and in general their relative exposure to Growth has been quite positive. (We look at both realized and expected growth in this factor). However, in the aftermath of the tech bubble, exposure actually sunk to negative. In general, since the sector is derived from the large-cap universe<sup>3</sup>, this is not the result of vastly lowered expectations (or outright de-listing) for the numerous Internet start-ups at the time. Most recently the Growth exposure is slightly below the long-term average for the sector, but is still higher than that of all sectors, except Real Estate and Consumer Discretionary.

**Leverage:** Tech stocks have had a negative exposure to Leverage since at least 1991 (in other words Tech stocks have less debt than other stocks in the Russell 1000), although that exposure has become less negative over the years. Currently, the exposure is the lowest of the 11 sectors.

**Liquidity:** Until 2009, the Tech sector tended to have highly positive exposures to Liquidity (they tend to see more of their market cap traded on a daily basis than other stocks). Interestingly, despite the strength in the sector and the popularity of many of its constituents, its Liquidity exposure recently reached a historically low level.

**Market Sensitivity:** Also interesting is that Tech stocks are no longer the very high-beta stocks they once were. (Like beta, Axioma's Market Sensitivity factor measures a stock's sensitivity to movements in the market.) Similarly, Tech's exposure to Volatility turned negative at the end of 2015 and has remained there, hitting a historically low level at the end of 2016.<sup>4</sup> Tech's exposure to both factors currently sits in the middle of the pack relative to all other sectors.

**Medium-Term Momentum:** Not surprisingly, in the buildup of the tech bubble, the sector's exposure to Momentum was quite positive, only to plummet as the stocks' fortunes turned south, bottoming out near -1 at the end of March 2001. More recently the exposure has been slightly positive, with a big boost coming at the end of April given the sector's strength. This Momentum exposure is higher than that of any other sector; only Financials is close, whereas most other sectors have negative exposures.

**Profitability:** Technology's exposure to Profitability peaked in early 1998 and bottomed in early 2002, but has remained positive throughout our study history. The current level is just slightly positive, but is only exceeded by Consumer Discretionary and Consumer Staples.

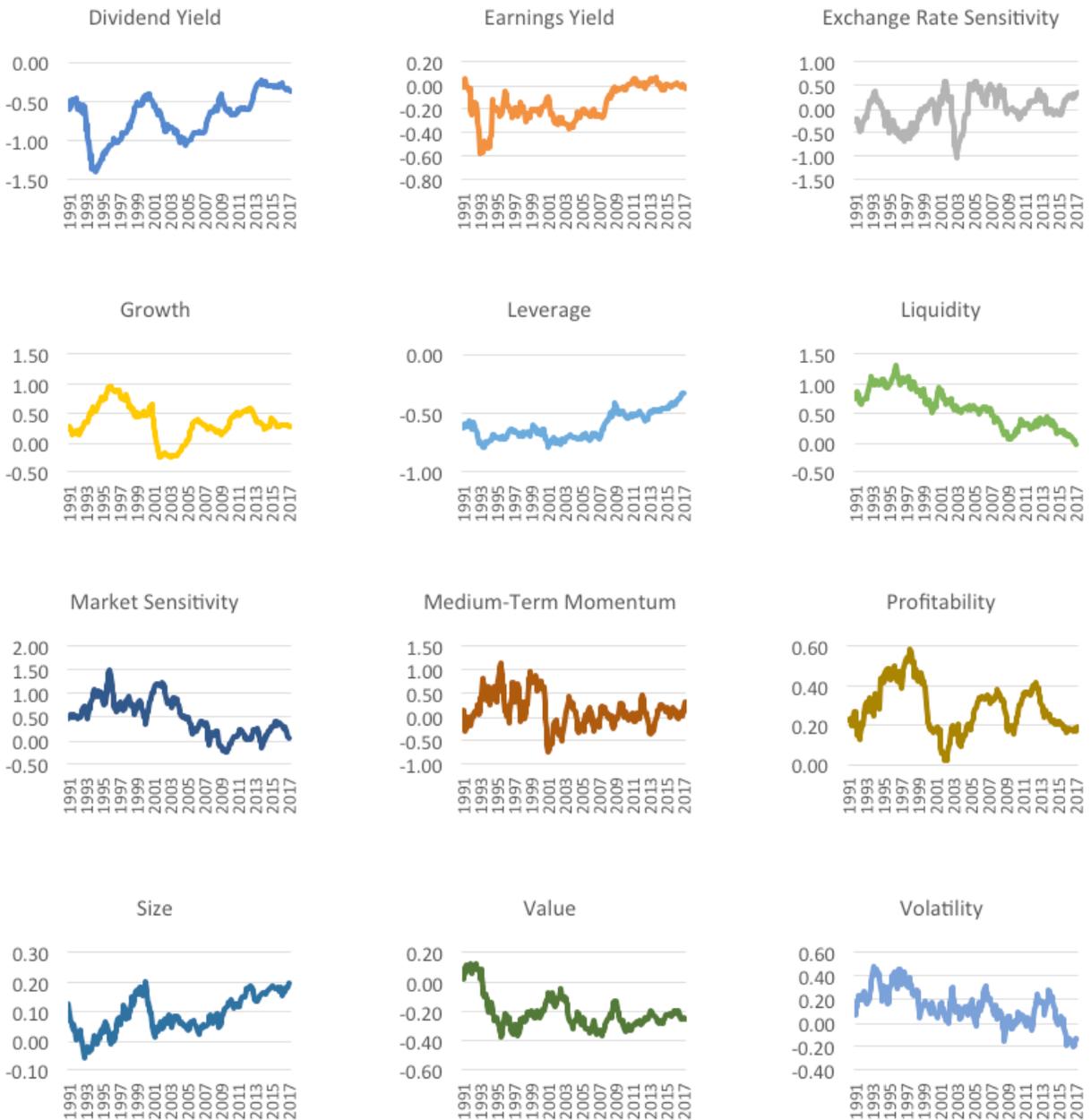
**Size:** Except for a brief period early in our test history, Technology has had a positive exposure to Size. That exposure has grown steadily since 2009 (perhaps corresponding to the increasing capitalizations of companies like Apple), and it is one of the few sectors with a positive exposure to Size. As of the end of April, however, it was not the sector with the biggest exposure to size; that honor went to Telecomm, which has few stocks in it, so it is dominated by AT&T and Verizon.

<sup>3</sup> For example, at the end of 2001, the sector was dominated by Microsoft, Intel, IBM and Cisco. In May 2010, Apple took the top spot in the index, and has remained there ever since.

<sup>4</sup> Notably, the biggest increase in Volatility exposure over the past few years occurred in the Utilities sector.

**Value:** In general, Technology's Value exposure (based on book/price) has been negative since the early 1990s (when the sector was dominated by IBM), and its current level of exposure is just about equal to its long-term average level. Only two sectors currently have lower exposures, Consumer Discretionary and Consumer Staples—the same two sectors that were also more profitable than Technology.

**Figure 5. Style Factor Exposures**



Source: FTSE Russell, Axioma

## Valuation Data

Finally, we have calculated the Price/Earnings (“P/E”) and Price/Book (“P/B”) ratios for the sector relative to those of the Russell 1000. For this calculation, we used trailing earnings and latest reported book value, and did some trimming to eliminate the most negative earnings that might distort the overall picture. The sector ratios are calculated by inverting the harmonic weighted mean. Even with that trimming, though, we find that P/B for the sector soared during the Internet bubble, reaching a level of about three times that of the market before plummeting along with stock values, to reach parity with the index by early 2003 (**Figure 6**). Since that point, however, the sector’s Price/Book ratio has been consistently above that of the market. Excluding the bubble period, the current ratio is fairly close to an all-time high.

As Technology earnings tumbled in the post-bubble period, relative Price/Earnings ratios soared, peaking in early 2002. Since 2009, however, the relative P/E for the sector has hovered around that of the index. Combining this observation with the data from the factor exposures suggests that even with the recent run-up, Technology stocks do not look very overvalued.

**Figure 6. Valuation Data, Long-Term and Last 10 Years**



Source: FTSE Russell, Axioma

## Investment Opportunities

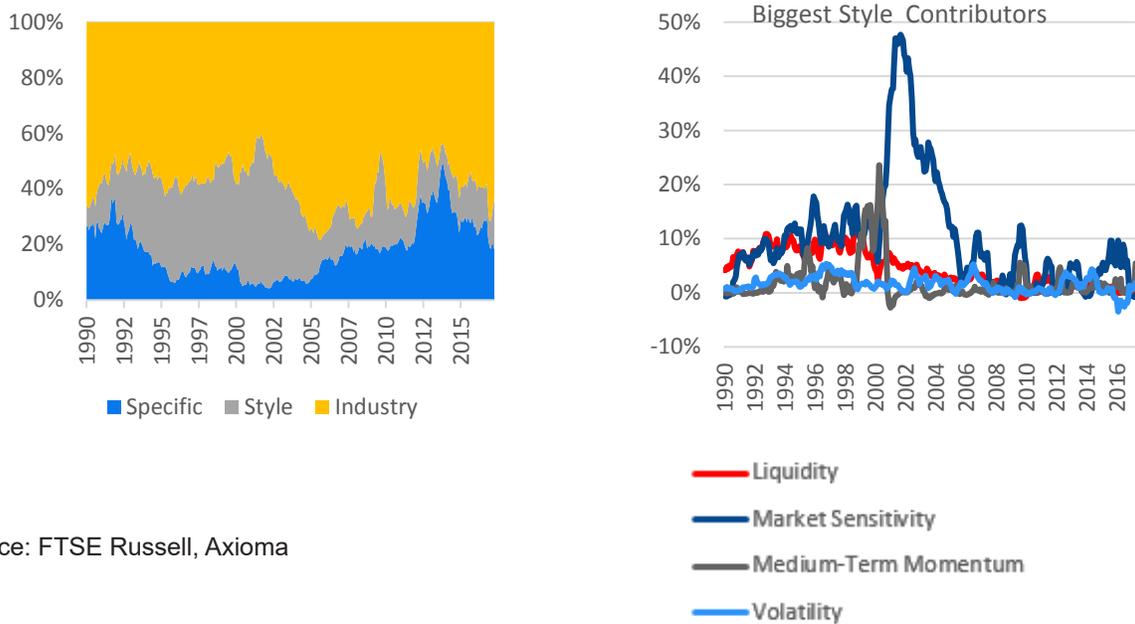
Of course, it’s not all about risk. We have also taken a look at investment opportunities in the sector, albeit through a risk lens.

In **Figure 7** we have laid out the percent of Technology’s active variance attributable to the main risk model factors—Stock Specific, Style and Industry. The goal here is to determine how much of the sector’s risk is a result of its exposure to the industries that comprise Technology (i.e., the variation in active returns that comes from a stock being a Technology stock or not), how much is the result of the sector’s style factor exposures and how much is purely stock specific—how much value a stock picker could potentially add.

The good news for Technology analysts is that the proportion of risk that is stock specific is relatively high, and the percent of risk coming from industry membership is relatively low (among sectors, only Consumer Staples has a lower proportion of industry risk). It is also interesting to see how style risk was a large proportion of overall risk until about 2005, but fell off after that. Market Sensitivity has generally been a large component of the style risk, and it was joined by Liquidity risk in the first 10 years of our study. After the Tech bubble burst, Medium-Term Momentum was also a significant contributor (as we mentioned earlier, the sector's exposure fell precipitously in that era).

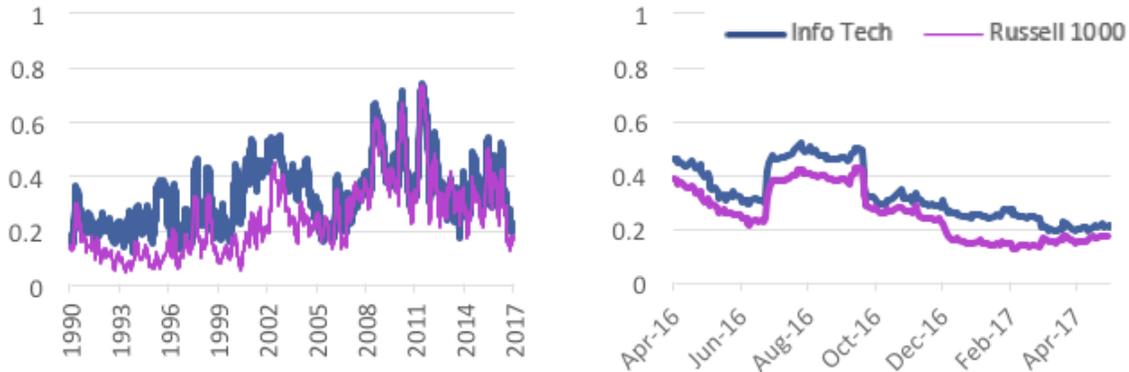
Another way to look at the opportunity set within a sector is to calculate correlations among stocks. In general, if correlations are low it means that stocks are moving based on their own fundamental characteristics, and are being driven less by a common theme that is driving all stocks. Therefore, periods of low correlation should presumably benefit stock pickers. For the Russell 1000, overall correlations have fallen sharply recently, approaching levels last seen in the late 1990s (Figure 8). Until about 2003, Technology stocks typically had much higher correlations than the broader market (to be expected when industries account for a large portion of risk). Since then, Technology correlations have moved more in step with the Russell 1000's, and over the past year have been just a bit higher. From this perspective, picking stocks within the Technology sector should offer no more or less opportunity than choosing among a wider set of names.

Figure 7. Contribution to Active Variance



Source: FTSE Russell, Axioma

Figure 8. Median Rolling 60-Day Correlation



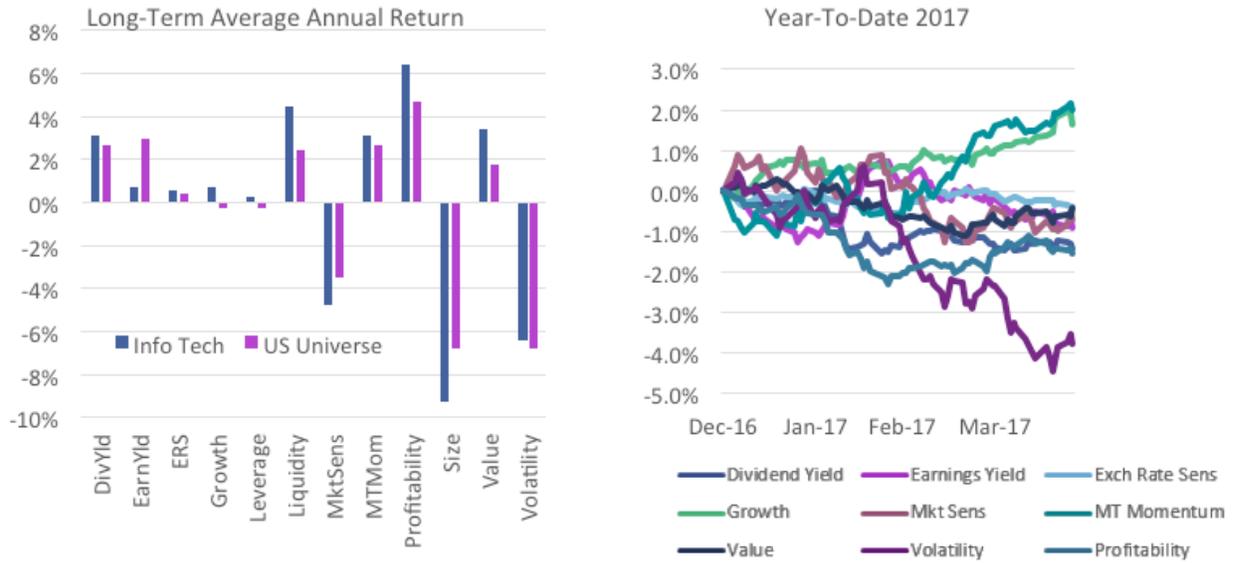
Source: FTSE Russell, Axioma

Which factors might help an investor choose among stocks in the Technology sector? To answer that question, we wanted to see how various style factors fared within the sector and compare those returns with those in the broader universe. In order to do this, we created a custom sector risk model using Axioma's Risk Model Machine. All settings for this exercise were the same as we use in our standard model, the only difference was that we limited the universe to the Technology sector.

It was somewhat surprising to see that annualized factor returns within the sector were similar in direction to those in the broader universe, if not of the same magnitude (**Figure 9**). Some factors' returns were more positive in the sector-specific model (most notably Profitability and Value, with Medium-Term Momentum faring slightly better), while Earnings Yield was notably worse, and there was a bigger small-cap premium for the sector (in other words, the factor return was more negative, meaning small-cap stocks outpaced their large-cap peers). Factor returns were almost always more volatile for Technology than for the universe as a whole, but that is to be expected given that there are far fewer names and much less diversification. Therefore, while readers may want to use the factor return information as a stock selection tool for Technology stocks, risk measurement and management is probably more effectively done across the whole portfolio.

So far this year (low) Volatility, Medium-Term Momentum and Growth are faring better in the Technology sector than in the universe as a whole, whereas Dividend Yield, Earnings Yield and Profitability have produced lower returns within the sector.

Figure 9. Style Factor Performance



Source: FTSE Russell, Axioma

Our last set of charts depicts Technology’s correlations with a few economic variables, as well as with a few other sectors. In **Figure 10** we have calculated rolling correlations using trailing 12- and 36-month windows between Technology’s returns and changes in oil prices, gold prices, the trade-weighted US dollar, and the 10-year US Treasury yield. Shorter-term correlations fluctuate quite a bit and have varied from quite positive to quite negative; 36-month correlations give a clearer picture of the longer-term relationship between Technology stock returns and these variables. Technology stocks have been positively correlated with the 10-year bond yield, so they tend to rise when the yield goes up and vice-versa. That has also been the case most of the time for the shorter horizon. In contrast, the correlation with the dollar has tended to be negative, especially since 2009, so a strong dollar would have been bad for Technology, which is not surprising given that many companies in the sector are big exporters. Tech stocks were highly correlated with oil prices from 2009 to 2014, although it is difficult to tease out the economic intuition. And not surprisingly, there has generally been little relationship between gold and Technology stocks.

**Figure 11** details rolling 36-month correlations between Technology returns and other sectors. The median correlation has usually been close to zero, except during the period of the Internet bubble and bust, when Technology stocks clearly marched to their own tune. On average over the whole period, as well as most recently, Technology has had the highest correlation with Consumer Discretionary stocks. Over the entire test period, Technology had the lowest correlation with Utilities, although more recently its biggest negative correlation has been with Industrials.

**Figure 10. Rolling 36-Month Correlations: Economic Variables and Other Sectors**



Source: FTSE Russell, Axioma

**Figure 11. Sector Correlations**



Source: FTSE Russell, Axioma

## Conclusion

The nature of the Information Technology sector has changed considerably over the years for a number of reasons. Stocks comprising most sectors must evolve over time to remain competitive, but the Technology sector has seen a sea change, as the dominant stocks have shifted from hardware and services behemoths, such as IBM and Intel, to Internet names, most notably Apple, which now stands well above the crowd. At the same time, Microsoft has been one of the biggest weights in the sector since the early 1990s. In addition, Technology stocks suffered from a bubble unlike anything investors have seen in most other sectors, and the aftermath of that bubble took years to sort itself out.

Over the years, Technology's exposures to a number of style factors changed substantially, including a less negative exposure to Dividend Yield, an exposure to Leverage that moved from negative to positive, net positive exposure to Liquidity that dropped to zero, a much more positive Size exposure (at least in part the result of Apple's price appreciation), a Market Sensitivity exposure that has dropped closer to zero and a Volatility exposure that has actually been negative more recently.

The sector also seems to provide greater opportunity for stock pickers more recently, versus earlier in our test period, with higher specific risk and lower intra-sector correlations. A few factor bets have better long-term average payoffs as compared with the broader universe, especially Profitability and Value. Technology can also help hedge risk in the portfolio, as it generally has a low or negative correlation with other sectors. And finally, the sector can be seen as a hedge against a rising US dollar. Many of these observations have led us to the overall conclusion that this is not your father's Technology sector!



**Contact us to learn more about how Axioma can bring more information and insights to your investment process.**

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