DOES SECTOR ROTATION WORK?
“What goes around comes around.”

- Proverb
BUSINESS CYCLE BASED SECTOR ROTATION

There is a general market wisdom that certain sectors perform well and other sectors perform poorly during different points in the economic cycle.

For example, Fidelity\(^1\) notes that sectors like Consumer Staples and Utilities – commonly held as “defensive sectors” – can be used by investors to out-perform during an economic recession. On the other hand, sectors like Technology or Consumer Discretionary can be used to out-perform in early economic expansions.

The logic behind such a strategy is that the business cycle will be the predominant determinant of equity sector returns over the intermediate term.

For example, early-cycle expansion phases are typically associated with lower interest rates and strong GDP growth. Sectors that may do well in such an environment are Consumer Discretionary or Industrials.

Amidst a recessionary period, credit will typically contract and sales growth will turn negative. In these environments, economically sensitive sectors will fall out of favor and less sensitive sectors will rotate into favor.

While each economic cycle may be unique, the phases of the broad economic cycle will tend to have similar characteristics throughout time. History may not repeat, it will certainly rhyme.

Or so the story goes.

The problem is that the evidence does not support the story. Consider that during the peak to trough economic contraction of the Great Recession (December 2007 to June 2009), Durables were one of the worst performing sectors while Technology was one of the best. Technology, in particular, is an interesting counter-example given it was the sector that had performed the worst when the dot-com bubble burst.

However, the Technology sector in 2000 was very different than the Technology sector in 2007: the former was filled with internet hardware companies while the latter was filled with internet software companies, which may have much higher profit margins do to their “winner take all” nature. With the very composition of the industry changing over time, it is hard to argue that the sector will always do well in a particular part of the business cycle.

Anecdotes aside, in Sector Rotation across the Business Cycle\(^2\), the authors seek to put hard evidence behind economic-cycle driven sector investing.

In a unique approach, the authors argue that for economic-cycle based sector rotation to be feasible, it must at least work for a clairvoyant investor who can perfectly time business cycle stages.

To replicate this clairvoyant investor, the authors use phases of economic expansion and contraction, as defined by the national Bureau of Economic Research, from 1948-2007. Knowing exactly what part of the business cycle they are in at any given time, the authors invest with prevailing sector rotation wisdom. The results are less than convincing:

“EVEN WITH PERFECT FORESIGHT AND IGNORING TRANSACTION COSTS, SECTOR ROTATION GENERATES, AT BEST, 2.3 PERCENT ANNUAL OUTPERFORMANCE FROM 1948 TO 2007.”

What if the investor anticipates the business cycle, getting a jump on her peers? The authors tested this as well: perfect anticipation actually was a drag, reducing outperformance from 2.3 percent to 1.9.

While 2.3, or even 1.9, percent out-performance may seem interesting to investors, it represents a best case scenario where an investor can perfectly time the business cycle. This is, obviously, a completely unrealistic assumption.

While business-cycle based sector rotation tells a wonderful story, all empirical evidence suggests that it quite simply does not work.

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VALUE BASED SECTOR ROTATION

Value is a phenomenon where securities that appear “cheap” tend to out-perform securities that appear “expensive.”

Benjamin Graham and David Dodd are often credited as the origin of the value approach. According to Graham and Dodd, investors should select securities by identifying a company’s intrinsic value and buying shares that are trading at a substantial discount to that value.

While originally applied to individual stocks, the value phenomenon has been identified in bonds, country equity index futures, commodities, currencies, and equities globally.

It should be no surprise, then, that value can be applied on a sector-basis as well.

In this study, we define value by comparing 1-year dividend yield versus its historical average. Specifically, we calculate a z-score1 for each sector using the prior 5 years of data. By normalizing with a z-score, we can compare the premium or discount of each sector’s yield versus its historical average across the different sectors.

On a monthly basis, we sort the sectors by their z-score and bucket them into quintiles. The sectors falling into each quintile are used to form equal-weight portfolios. Once the portfolio is formed, it is held for a period of five years, giving the value premium time to mature.

To allow for monthly evaluation with a five year holding period, we utilize 60 overlapping portfolios.2

The results of this simple approach are promising. While the market returned an annualized 10.57%, the cheapest quintile portfolio returned 12.99% and had a volatility 1.2 percent less than the market portfolio.

In dollar terms, $1 invested in the market became $2,408.11 while $1 invested in the cheapest quintile portfolio became $13,302.42.

It has been well established that taking a value approach works. Our simple study shows that applying a value approach with sectors works as well.

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1. A Z-score is a statistical measurement of a score’s relationship to the mean in a group of scores. A Z-score of 0 means the score is the same as the mean. A Z-score can also be positive or negative, indicating whether it is above or below the mean and by how many standard deviations.

2. As an example, the cheapest sector quintile on January 1st, 2010 would be comprised of an equal-weight basket of the 60 cheapest sector portfolios formed each month between January 1st, 2010 and January 1st, 2015. On February 1st, 2015, the portfolio would be comprised of an equal-weight basket of the 60 cheapest sector portfolios formed each month between February 1st, 2010 and February 1st, 2015.
Momentum is a phenomenon where securities which have recently out-performed their peers tend to continue to out-perform, and those that under-perform tend to continue to under-perform.

This approach can often be confusing to investors who are told that “chasing performance” is dangerous. However, momentum investing seeks to capitalize, through a systematic process, on the behavioral inefficiencies exhibited by investors.

Academically, the concept of momentum was introduced by Narasimhan Jegadeesh and Sheridan Titman in their 1992 whitepaper Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency. In the paper they identified that past relative performance was indeed indicative of short-term relative future results in stocks.

Later studies would show that momentum was effective when applied to country indices, international stocks, foreign exchange, emerging market stocks, commodity futures, non-investment grade corporate bonds, and even liquid fixed-income assets.

In this study, we apply momentum on the primary U.S. sectors. Each month we calculate total return for each sector over the trailing 12-month period, excluding the most recent month (to account for short-term reversals). Sectors are sorted based upon returns into quintiles and equal-weight portfolios are formed. Once formed, the portfolio is held for a month.

To account for the month-long holding period, each quintile portfolio is made up of four overlapping portfolios, each evaluated on a different week of the month.

The results show a promising increase in annualized returns from low momentum to high momentum portfolios. Over the period $1 invested in the market turned into $3,655.69 while $1 invested in the high momentum portfolio turned into $74,444.38.

Momentum is a well established phenomenon. Here we show that investing using a momentum methodology with sectors can generate significant return.

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RELATIVE MOMENTUM BASED SECTOR ROTATION

Annualized Returns
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**TREND FOLLOWING BASED SECTOR ROTATION**

Trend following, or “time-series momentum,” is a cousin to the relative momentum we explored in the prior section. The primary difference is that where the relative momentum anomaly finds that relative performance is predictive, time-series momentum finds that absolute performance is predictive.

In other words, securities that are appreciating in value tend to continue to appreciate and those that lose value tend to continue losing value.

In this study, prior twelve-month total return, skipping the most recent month, is calculated for each sector. Sectors exhibiting negative momentum are removed and those remaining are given an equal weight within the portfolio. A cap of 25% is applied so that if 3 or fewer sectors are exhibiting positive momentum, a position in the risk-free security is held. In fact, if no sectors are exhibiting positive momentum, this portfolio will sit entirely in the risk-free asset.

Once the portfolio is formed, it is held for a month. The final portfolio is comprised of four overlapping portfolios, each rebalanced on a different week of the month and held for a month.

The five worst returning years for the market over the evaluation period were 1929, 1930, 1937, 1974 and 2008 – all crises, but all unique in their own way. During these years, the time-series momentum approach out-performed by an average of 1938 basis points ("bps").

In fact, the time-series momentum portfolio out-performed the market in all 10 of its worst performing years, out-performing by an average of 1317bps.

In the best 10 performing years, the time-series portfolio underperformed on average by -226bps, largely skewed by a particularly bad relative return in 1975 (40.11% vs 7.82%).

Much like value and relative momentum, this study shows that a time-series momentum approach can be effectively implemented using sectors.

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**Yearly Returns Scatter Plot**

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UNCOMFORTABLY IDIOSYNCRATIC

On the following page, we plot rolling 1-year, 3-year, and 5-year performance for each of the value, momentum, and time-series momentum strategies relative to the market. A value above zero means the strategy has out-performed the market over the trailing period; a value below zero means it has under-performed.

What we see is that despite the strong long-term relative performance of each strategy demonstrated on the prior pages, each strategy went through periods of significant relative dislocation.

For example, we see that while momentum did exceedingly well during the dot-com boom, both value and time-series momentum failed to keep up with the market. Yet when momentum crashed in 2000, it was value and time-series momentum that out-performed.

Each of these strategies goes through periods of uncomfortably idiosyncratic performance relative to the market. For the 2000+ basis points (“bps”) of relative out-performance that time-series momentum provided in the 2008 crisis, from 2/2009 to 2/2010, a time-series momentum approach under-performed by ~4500bps+.

These periods of under-performance, however, are exactly what allow these processes to have long-term efficacy. Short-term underperformance shakes out investors that do not have the fortitude to stick with the process through prolonged periods of under-performance – even when the under-performance is well within historical norms.

CONCLUSION

Sector rotation theory says that sector performance, relative to the broad market, is tied to the business cycle. While the story for sector rotation sounds reasonable, it fails to pass logical scrutiny. The most obvious example is the technology sector, which is commonly held out to under-perform during recessions and out-perform in expansions. Yet technology lagged considerably after the dot-com bust and out-performed significantly during the Great Recession.

One argument as to why could be the shifting composition of the sector itself from internet hardware to internet software. With the very composition of sectors changing over time, it is hard to argue how we should expect them to perform in future business cycles we have yet to comprehend the basis of.

The approach also fails to hold up to statistical scrutiny. The study titled Sector Rotation across the Business Cycle found that even with perfect foresight into the business cycle, applying common sector rotation logic failed to produce significant out-performance.

So not only does business cycle sector rotation fail to be well-founded in economic theory, it also fails to be established in empirical evidence.

While sector rotation may be debunked, rotation across sectors using other successfully established investing techniques like value, momentum, or time-series momentum proves to be fruitful.

Each of these techniques, however, can go through prolonged periods of relative under-performance. So while rotation across sectors using these techniques can be a powerful tool in an investor’s toolkit, long-term success is only possible if the investor has the fortitude to ride out short-term relative under-performance.

One way to manage this short-term volatility is to embrace diversification. Below, we plot the rolling 1-, 3-, and 5-year relative returns against the market of a portfolio equally invested across all three strategies. We can see that by mixing value, relative momentum, and time-series momentum, an investor would have achieved much more consistent relative out-performance.
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Rolling 1-Year Performance Difference to Market

Rolling 3-Year Performance Difference to Market

Rolling 5-Year Performance Difference to Market
Past performance is no guarantee of future returns.

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