

Relative Rotation Graphs (RRG Charts)

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Introduction

Relative Rotation Graphs or RRGs, as they are commonly called, are a unique visualization tool for relative strength analysis. Chartists can use RRGs to analyze the relative strength trends for several securities against a common benchmark, and against each other. The real power of this tool is its ability to plot relative performance on one graph and show true rotation. We have all heard of sector and asset class rotation, but it is hard to visualize this “rotation” sequence on linear charts. RRGs use four quadrants to define the four phases of a relative trend. True rotations can be seen as securities move from one quadrant to the other over time.

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Background

RRGs were developed by Julius de Kempenaer of RRG Research in 2004-2005 while working as a sell-side analyst for an investment bank in Amsterdam. In particular, he was confronted with two problems when producing technical/quantitative research on European sectors. First, institutional clients were much more interested in relative performance. Instead of directional forecasts, clients wanted to know where to be overweight and where to be underweight in their equity portfolios. Second, these institutional investors faced an enormous information overload that made it difficult to keep an eye on the big picture. In short, they needed a tool that would clearly separate the leaders from the laggards. Enter Relative Rotation Graphs. RRGs solved these problems with color-coded quadrants, a ranking table and an animation feature that make it easy to separate the leaders from the laggards.

JdK RS-Ratio

Before looking at the construction of Relative Rotation Graphs, let's look at the two main inputs: JdK RS-Ratio and JdK RS-Momentum. Note that both input indicators are “normalized”, which means these indicators are expressed in the same unit of measure and fluctuate above/below the same level (100). This normalization process means RS-Ratio values for different securities can be compared, as long as the same benchmark is used.

RS-Ratio is an indicator that measures the trend for relative performance. Similar to the price relative, RS-Ratio uses ratio analysis to compare one security against another (usually the benchmark). It is designed to define the trend in relative performance and

measure the strength of that trend.

The chart below shows the Technology SPDR (XLK) in the main window, the price relative (XLK:\$SPX ratio) in the middle window and the RRG indicators in the bottom window. We will focus on RS-Ratio (red) first. RS-Momentum (green) will be covered in the next section.



RS-Ratio gives chartists a clear tool to define the trend in relative performance. This indicator reflects an uptrend in relative performance when above 100 (relative strength) and a downtrend in relative performance when below 100 (relative weakness). The further the indicator is above 100, the stronger the uptrend in relative performance. The further the indicator is below 100, the stronger the downtrend in relative performance.

As with all trend-following indicators, such as moving averages, the trend-following model that powers RS-Ratio includes a lag period. This means there will already be upward movement in the price relative before RS-Ratio crosses above 100. Conversely, there will already be downward movement in the price relative before RS-Ratio crosses below 100. Notice on the chart above how the price relative (XLK:\$SPX ratio) peaked in early August, but RS-Ratio did not cross below 100 until mid-October. Similarly, the price relative bottomed in mid-July, but RS-Ratio did not cross above 100 until mid-September. This is

typical for trend-following indicators that are designed to ignore the blips and focus on the trend. The chart below shows the Consumer Discretionary SPDR (XLY) with another example.



Keep in mind that the values for RS-Ratio can be compared when using the same benchmark security. Let's assume we are comparing relative performance for four sector SPDRs against the S&P 500 and the RS-Ratio values are as follows: XLK=102.04, XLI=101.41, XLF=100.2, and XLV=103.66. First, all four have RS-Ratios above 100 and this means all four show relative strength (against the S&P 500). Second, XLV shows the most relative strength because its RS-Ratio is the highest of the four. XLK is the weakest of the four because its RS-Ratio is the lowest.

JdK RS-Momentum

Before looking at RS-Momentum in detail, let's review the concept behind momentum and how it relates to trend. As with price charts, chartists should keep in mind that momentum changes course before the trend actually reverses. Not all momentum moves, however, result in trend reversals.

Consider an example using price and a moving average. Price first moves towards the moving average and then crosses the moving average if the move extends. Price, however, does not always cross the moving average to signal a trend reversal. Aggressive traders would more likely take a position as price moves towards the moving average because this means momentum is improving. Conservative investors would more likely wait for price to move above the moving average because the trend has not fully reversed.

RS-Momentum is an indicator that measures the momentum (rate-of-change) of RS-Ratio. As a momentum indicator, it leads RS-Ratio and can be used to anticipate turns in RS-Ratio. Typically, RS-Momentum crosses above 100 when RS-Ratio is forming a trough and starting to move up. Conversely, RS-Momentum crosses below 100 when RS-Ratio is forming a peak and starting to move down.

The chart below shows the Utilities SPDR (XLU) with RS-Momentum in green and RS-Ratio in red. RS-Momentum crossed above 100 in mid-December and held mostly above 100 for four weeks. Notice how RS-Ratio bottomed as RS-Momentum moved above 100 and RS-Ratio crossed above 100 later in January.



Keep in mind that RS-Momentum is an indicator of an indicator (RS-Ratio). Furthermore, it is a momentum indicator and that means it will move above/below the 100 level often. Chartists may want to focus on sustained moves above/below 100 to anticipate a similar cross in RS-Ratio.

The chart below shows the Biotech SPDR (XBI) with two examples highlighting the relationship between RS-Momentum and RS-Ratio. The gray shading shows RS-Momentum below 100 for four of six weeks in February-March. Even though the indicator

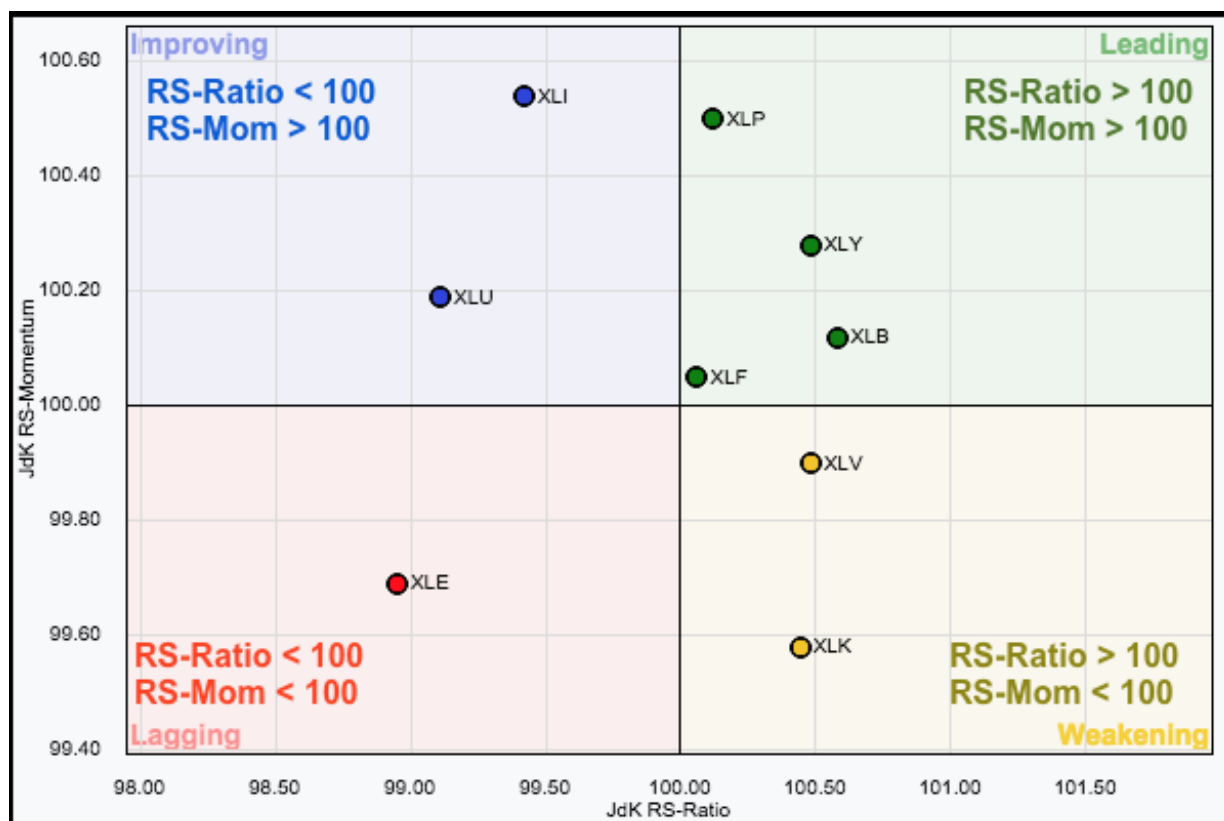
popped above 100 briefly, this pop did not last long and quickly moved back below 100. This was a sign that momentum was turning negative for RS-Ratio and RS-Ratio ultimately crossed below 100 in the second half of March.



The blue shading shows RS-Momentum above 100 from mid-April until late May. RS-Ratio bottomed as RS-Momentum moved above 100, but did not cross above 100 until the end of May. The cross above 100 in RS-Ratio, by the way, came just before the early June surge in XBI.

RRG Construction

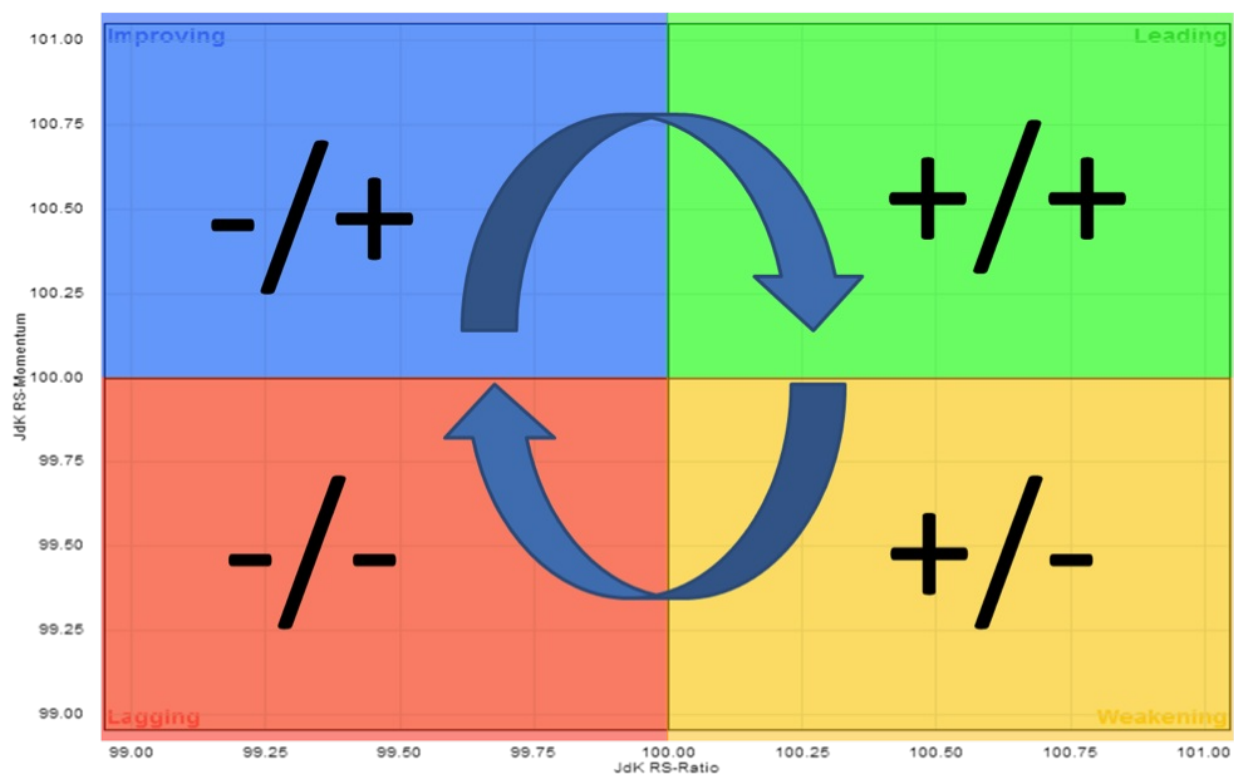
Relative Rotation Graphs are plotted on a standard scatter-plot canvas with an x-axis (horizontal) and y-axis (vertical). The JdK RS-Ratio indicator is the input for the horizontal axis, and the JdK RS-Momentum indicator is the input on the vertical axis. These axes cross at 100 to create four relative performance quadrants. The Relative Rotation Graph simply plots RS-Ratio and RS-Momentum values for each symbol. If the symbol universe is the nine sector SPDRs and the S&P 500 is the benchmark, we will see nine points on the Relative Rotation Graph (RRG) and each point represents that particular sector's RS-Ratio and RS-Momentum value.



The Relative Rotation Graph is shown above with four possible combinations. Let's assume we are using the nine sector SPDRs as our universe and the S&P 500 as the benchmark.

- A sector is in the leading quadrant (green) when RS-Ratio and RS-Momentum are above 100 (+/+). A positive RS-Ratio indicates an uptrend in relative performance and positive momentum means this trend is still pushing higher.
- A sector is in the weakening quadrant (yellow) when RS-Ratio is above 100, but RS-Momentum moves below 100 (+/-). A positive RS-Ratio indicates an uptrend in relative performance, but negative momentum means this uptrend is stalling or losing power.
- A sector is in the lagging quadrant when RS-Ratio and RS-Momentum are both below 100 (-/-). A negative RS-Ratio indicates a downtrend in relative performance and negative momentum means this downtrend is still pushing lower.
- A sector is in the improving quadrant when RS-Ratio is below 100, but RS-Momentum moves above 100 (-/+). A negative RS-Ratio indicates a downtrend in relative performance, but positive momentum means this downtrend is stalling or potentially reversing.

Rotation Sequence

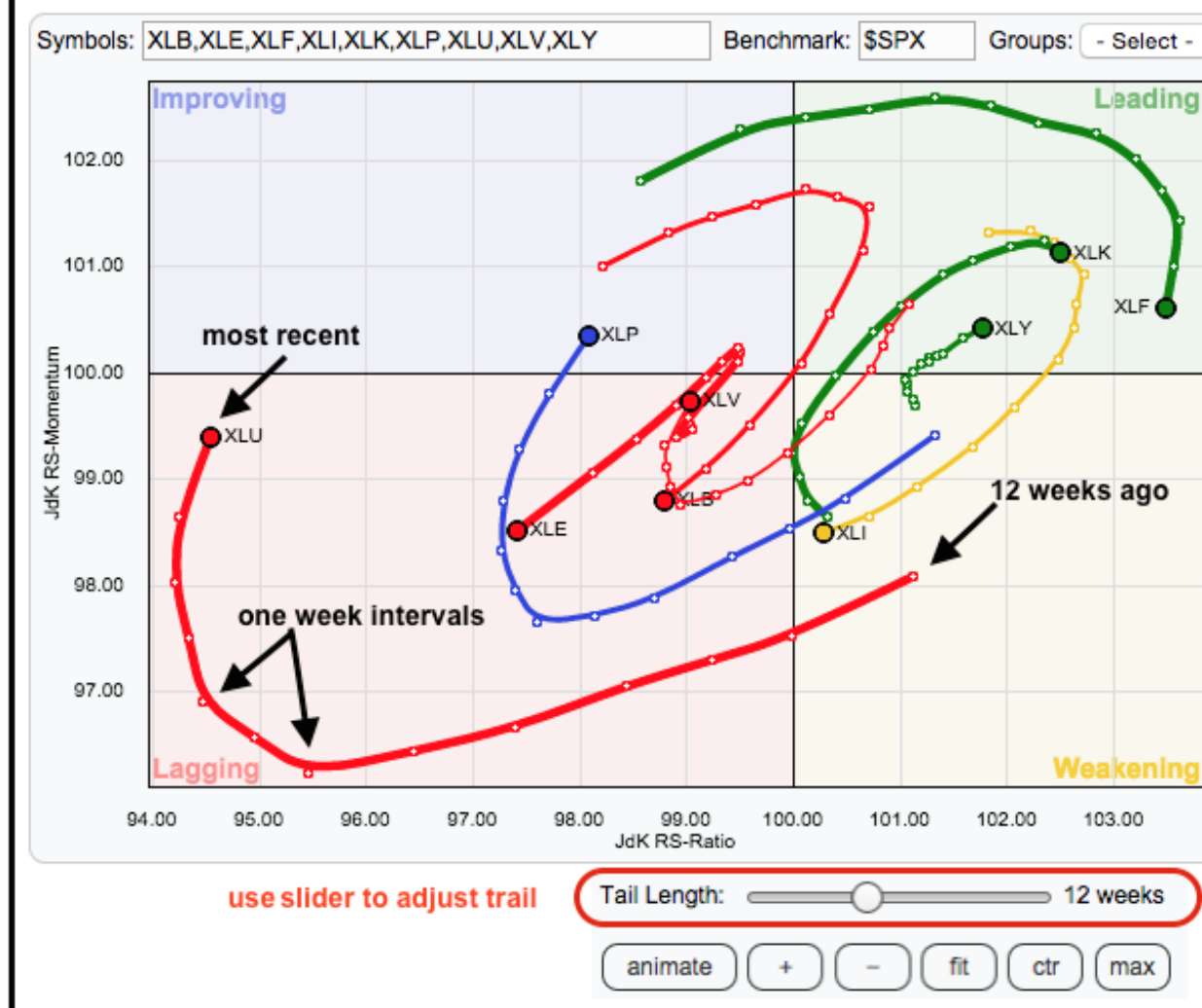


The arrows on the model Relative Rotation Graph above show the idealized rotation, which is clockwise. Let's assume a sector is currently in the leading quadrant (green) and follow the idealized rotation. Remember, RS-Momentum is the leading indicator here and it will be the first to turn. From the leading quadrant, relative momentum will start to level off and RS-Momentum will move below 100, which will cause the sector to move into the lower right-hand quadrant (weakening). Extended weakness in relative momentum will ultimately affect the trend in relative performance and RS-Ratio will also move below 100, which would put the sector into the lagging quadrant (red). Once in the lagging quadrant, the first sign of strength will be an improvement in relative momentum. When RS-Momentum crosses above 100, the sector will move into the improving quadrant (blue). A sector in this quadrant still has a downtrend in relative performance, but RS-Momentum is improving and this could foreshadow a move into the leading quadrant (green). Extended strength in relative momentum will ultimately affect the trend in relative performance and RS-Ratio will move above 100. This will push the sector into the leading quadrant (green) and the cycle will start over again.

Rotation Trails

Rotation comes alive with the historical trails. The chart below shows the nine sectors with 12-week trails and we can see them rotating from one quadrant to another. Each point marks one week, and the solid point with the symbol marks the most recent point. At the top, XLF moved from improving to leading. At the bottom, XLU moved from weakening to lagging. The blue line shows XLP moving from weakening to lagging, and then from lagging to improving. The improving quadrant means RS-Momentum moved above 100, but RS-Ratio remains below 100. XLY moved into the leading quadrant when both RS-Ratio and RS-Momentum were above 100.

Relative Rotation Graph (RRG) Charts



Chartists can also glean information from the length of the trails and the thickness of the trail lines. All trail lines extend 12 weeks on this chart, but some are longer than others. The red XLU trail is the longest and this means it has the biggest move and shows the most volatility. The green XLY line in the upper right is the shortest, which means it has the smallest move and is the least volatile.

The thickness of the lines depends on the distance from the benchmark, which is the crosshair on the RRG. The crosshair is also known as the origin where the x-axis (RS-Ratio) crosses the y-axis (RS-Momentum). Thicker lines will be further from the benchmark, and thinner lines will be closer to the benchmark. The further a security is from the benchmark, the bigger the move in relative performance (up or down). The closer a security is to the benchmark, the smaller the move in relative performance (up or down). In other words, the thicker lines represent bigger moves and the thinner lines represent smaller moves.

Users can change the trail length using the slider next to the Relative Rotation Graph. Chartists are encouraged to experiment with the trail length and the number of symbols on the graph. In general, chartists should shorten the trail length when there are a lot of symbols on the graph. This will help de-clutter and make the analysis easier. Longer trails are fine when just a few symbols are shown on the graph.

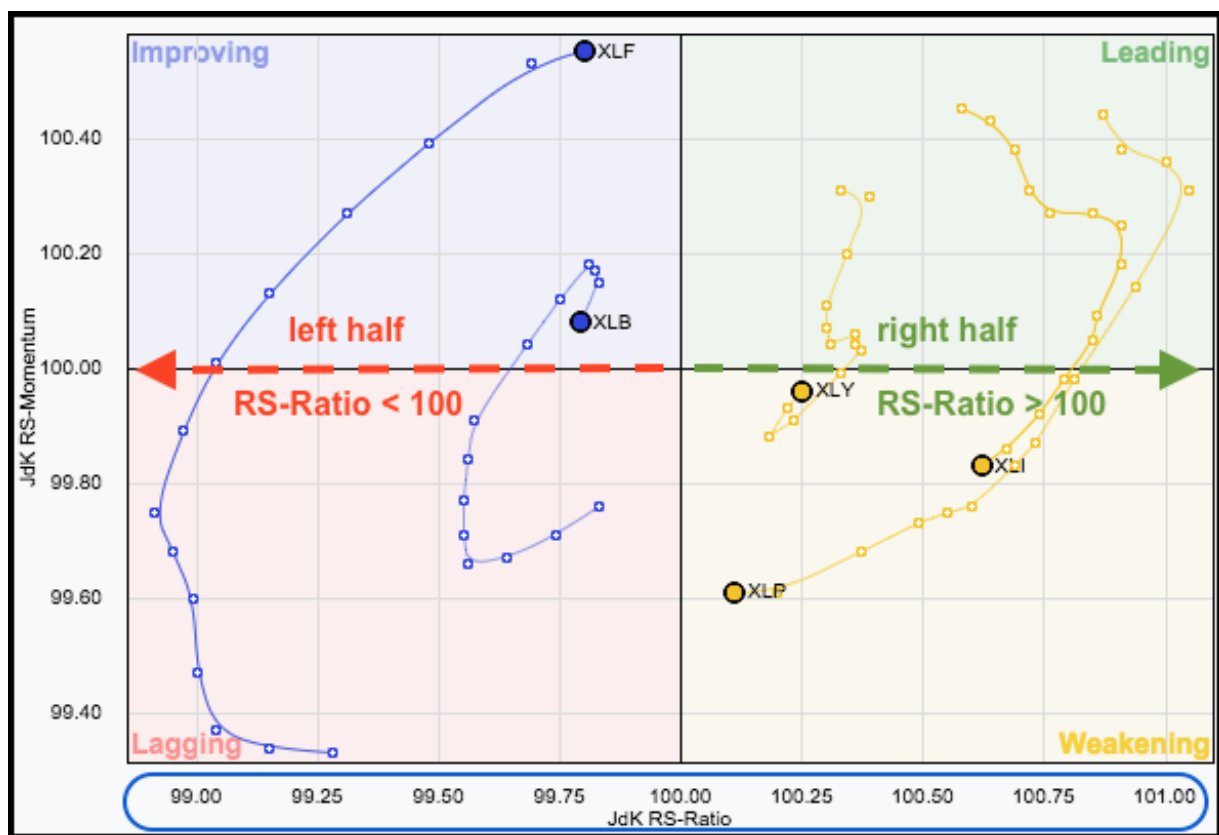
Interpretation

Before looking at some interpretation guidelines, bear in mind that Relative Rotation Graphs are not a trading system and there are no predefined trading rules or signals. Look at RRGs as another type of charting method that is open to interpretation. Different people looking at the same chart will come up with different interpretations. Here are some rules-of-thumb you may want to follow:

- RS-Ratio is more important than RS-Momentum. RS-Ratio is also the preferred metric for ranking a group of symbols.
- The table below each RRG ranks the symbols by quadrant according to their distance from the benchmark (crosshair on the RRG). The leading quadrant (green) is first, the improving quadrant (blue) is second, the weakening quadrant (yellow) is third and the lagging quadrant (red) is last. As the example below shows, XLK is the furthest from the benchmark in the leading quadrant and XLE is the furthest from the benchmark in the lagging quadrant. This often coincides with tail length because the securities with the longest tails are often the furthest from the benchmark.

chart	visible	tail	symbol	name	sector	industry	price	%chg
RRG	✓	■	XLK	Technology Select Sector SPDR			39.58	1.3
RRG	✓	■	XLV	Health Care Select Sector SPDR			64.16	5.2
RRG	✓	■	XLY	Consumer Discretionary Select Sector SPDR			67.13	0.2
RRG	✓	■	XLF	Financials Select Sector SPDR			23.17	2.1
RRG	✓	■	XLB	Materials Select Sector SPDR			50.08	1.4
RRG	✓	■	XLE	Energy Select Sector SPDR			91.41	-6.6
RRG	✓	■	XLI	Industrials Select Sector SPDR			53.01	-1.3
RRG	✓	■	XLU	Utilities Select Sector SPDR			41.39	-1.4
RRG	✓	■	XLP	Consumer Staples Select Sector SPDR			44.78	0.4
RRG			\$SPX	S&P 500 Large Cap Index			1982.85	0.2

- The rotational patterns are not always perfectly circular and will not always rotate through all four quadrants in a clockwise manner. These are, after all, financial markets driven by fear and greed.
- A historical trail can remain on the right side of the RRG when there is a strong uptrend in relative performance. This means RS-Ratio is holding above 100, and RS-Momentum is fluctuating above/below 100.

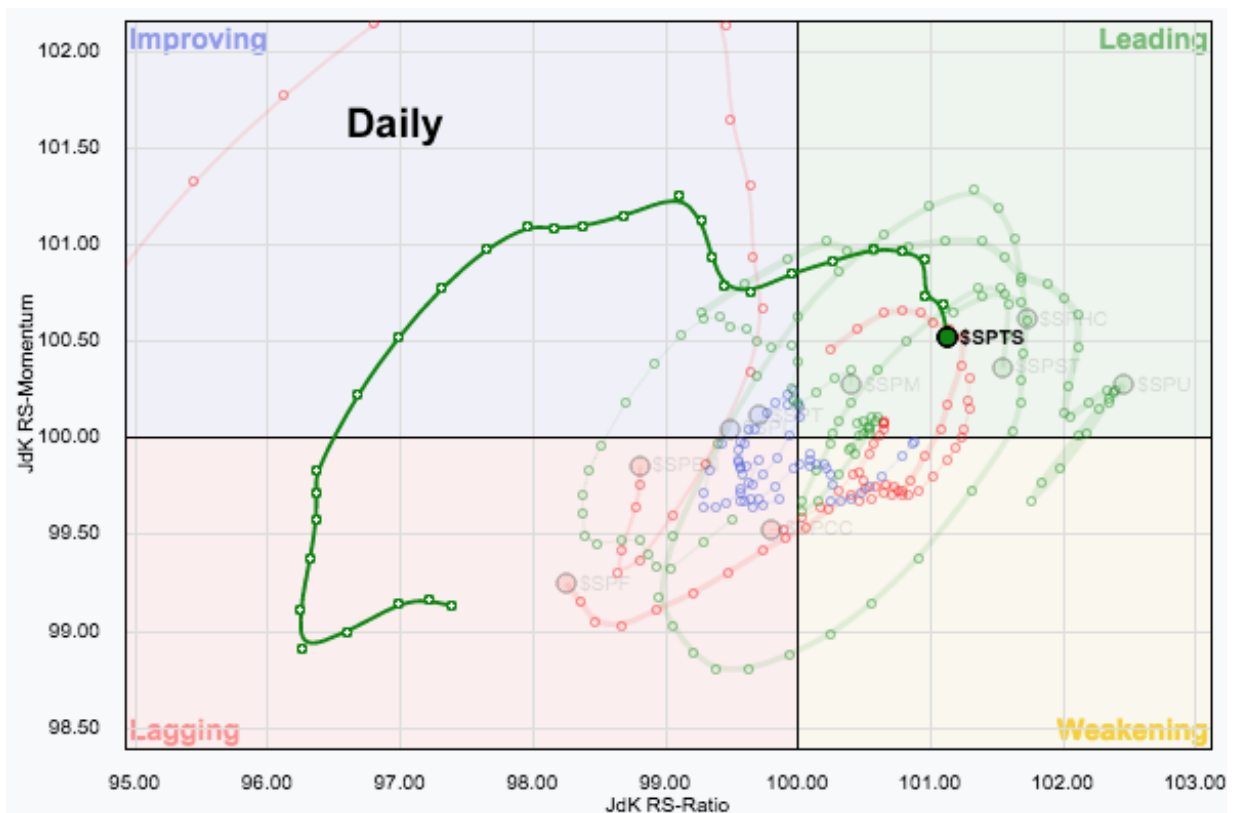
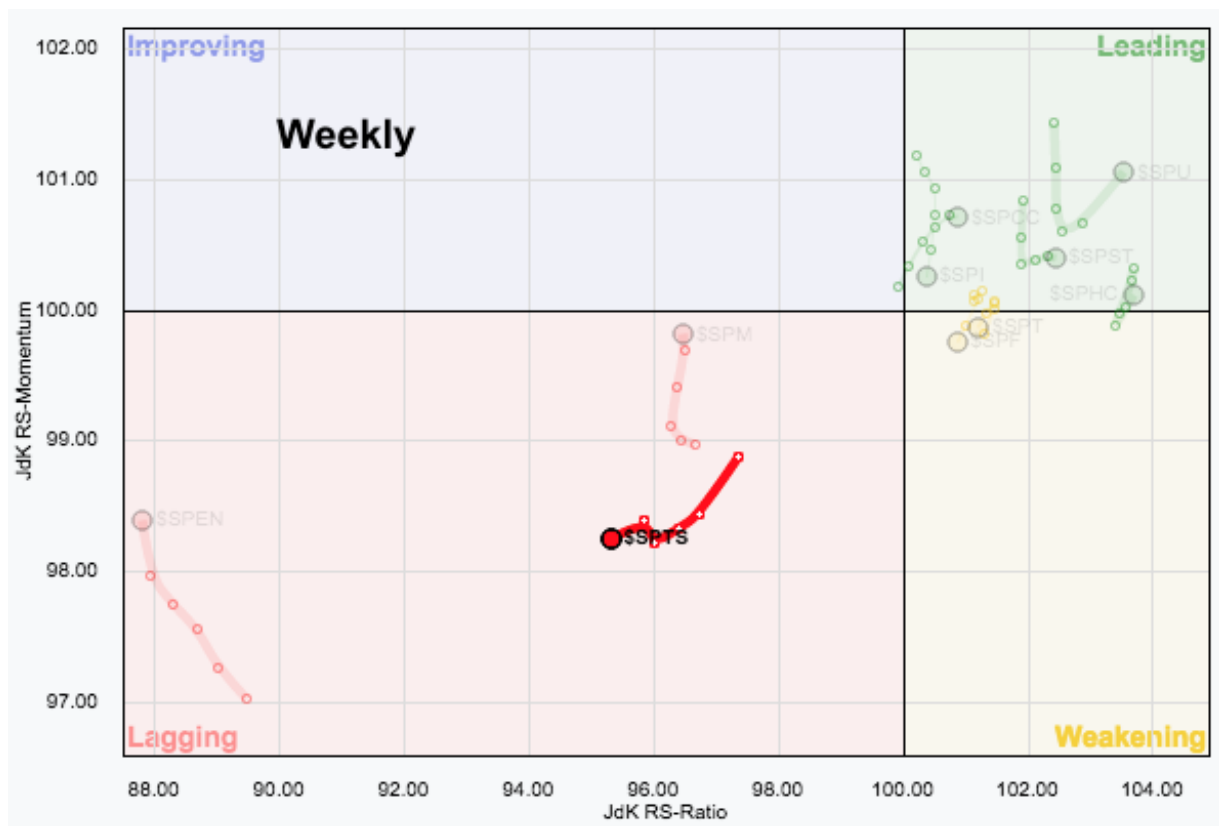


- Conversely, a historical trail can remain on the left side of the RRG when there is a strong downtrend in relative performance. This means RS-Ratio is holding below 100, and RS-Momentum is fluctuating above/below 100.
- In general, a cross from the left half to the right half signals a new uptrend in relative performance. This means RS-Ratio has moved above 100. Conversely, a cross from the right half to the left half signals a new downtrend in relative performance. This means RS-Ratio has moved below 100.
- The underlying trend-following model that powers RRG includes a lag period, as do all trend-following models. This means there will already be upward movement in the price relative before the RRG line actually crosses into the leading quadrant. Similarly, the price relative will peak and move lower before the RRG line actually crosses into the lagging quadrant.
- Symbols in the leading quadrant should be on your buy list because they show relative strength. Symbols in the weakening quadrant should be on your watch-list for deterioration. Symbols in the lagging quadrant should be on your avoid list because they show relative weakness. Symbols in the improving quadrant should be on your shopping list as potential buys.
- Relative Rotation Graphs on their own are not enough for making decisions. Instead, RRGs are great for channeling your attention to those areas of the market that deserve it.

Weekly Versus Daily

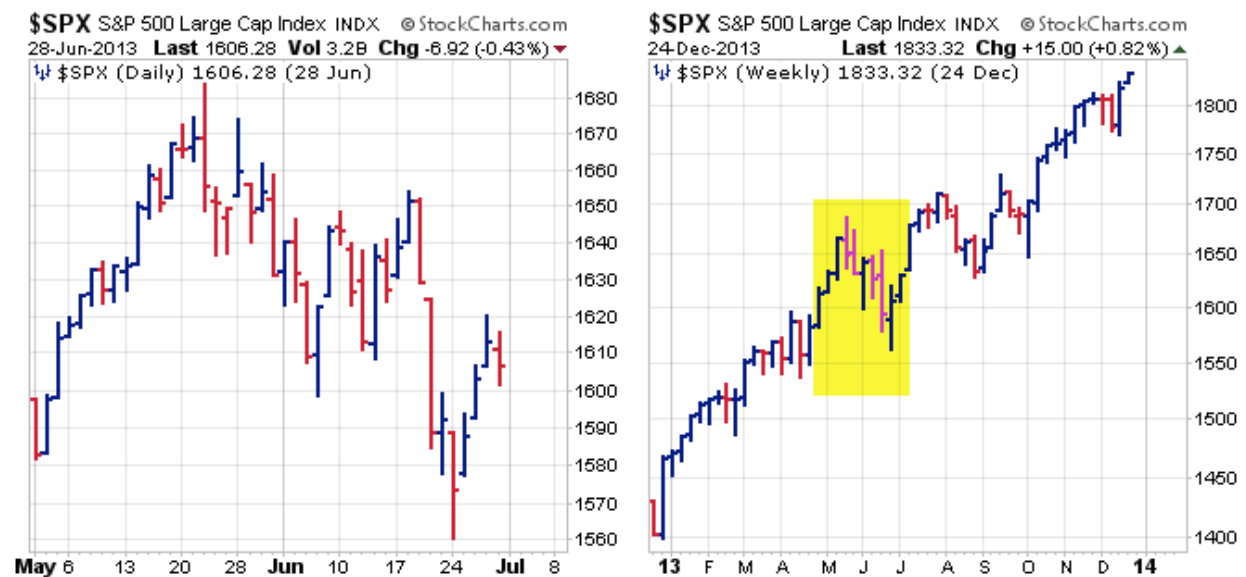
As with normal bar charts, line movements on a weekly RRG can look a lot different than line movements on a daily RRG. For example, the weekly RRG below shows the S&P

Telecommunications Sector (\$SPTS) in the lagging quadrant and clearly red. In contrast, the daily RRG shows the sector rotating from the lagging quadrant all the way to the leading quadrant. How can this be?



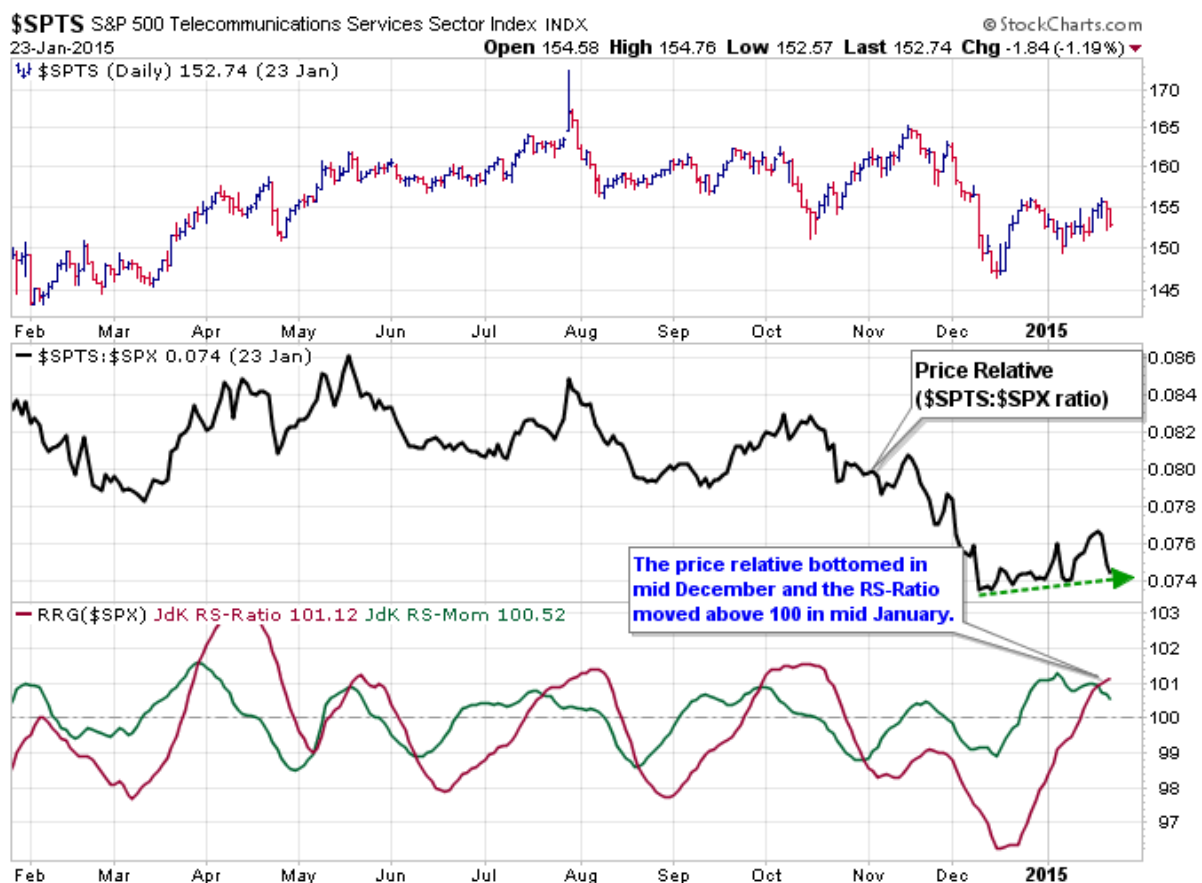
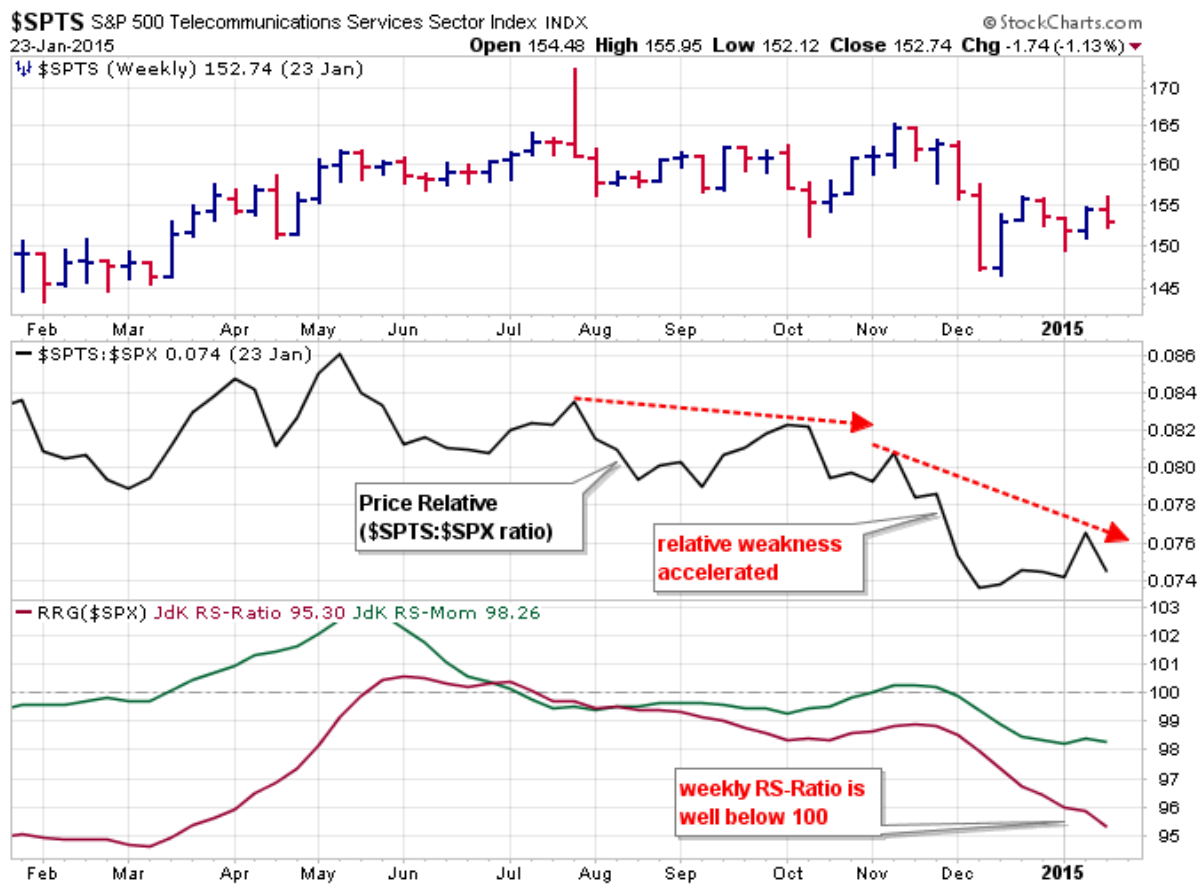
The chosen timeframe effects RRGs just like regular bar charts. In the example below, the left chart shows two months of daily data for the S&P 500, and the two-month trend is down. The chart on the right shows one year of weekly data and the overall trend is clearly

up. The yellow shaded area highlights the two months shown on the daily chart to put this decline into perspective. Clearly, this is a short-term downtrend (pullback) within a long-term uptrend.



The chosen timeframe effects RRGs the same way. A sector moving into the weakening quadrant on the weekly timeframe, like the Telecom sector above, can be in the leading quadrant on the daily timeframe as the sector is going through a short-term positive rotation. This short-term rotation, however, is not powerful enough, yet, to influence the rotation on the weekly RRG.

This can be clarified a bit more by looking at RS-Ratio and RS-Momentum on bar charts. The first chart shows weekly RS-Ratio and RS-Momentum, which correspond to the weekly RRG plot. The second chart shows daily RS-Ratio and Momentum, which correspond to the daily RRG plot. Notice how the weekly indicators show a long-term downtrend in relative performance and momentum is also negative. The daily indicators, on the other hand, turned up and moved above 100.



Assuming that weekly rotations are stronger than daily, and that a rotation will follow its normal clockwise course, one would expect the positive rotation on the daily timeframe to be temporary in nature. In a normal rotation, the sector would move through the leading quadrant, cross into the weakening quadrant and then push into the lagging quadrant, thus keeping it solidly inside the lagging quadrant on the weekly timeframe! In other words, the daily move is a short-term “hiccup” within an otherwise falling relative trend on the weekly.

As with all aspects of technical analysis, it is a very good habit to study different timeframes to get a complete picture. The Telecom sector is clearly deep inside the lagging quadrant on the weekly RRG - and moving further into the red. The decrease in negative momentum, which can be seen by the leveling of the trail slope on the weekly RRG, translates into a quick positive rotation on the daily RRG.

Conclusion

Relative Rotation Graphs make it easy to separate the market leaders from the market laggards. In this regard, RRGs save time, and money, because they narrow the focus to parts of the market that deserve attention for further analysis. RRGs can be tailored to suit any trading or investing style because they measure both momentum and trend for relative performance. Momentum traders can focus on crosses into the improving quadrant or the weakening quadrant. Trend followers can focus on crosses into the leading quadrant or lagging quadrant. Keep in mind that these are relative performance indicators, and there is still a risk that the rotation turns back or even reverses. As with all technical tools, these relative performance indicators should be used in conjunction with other technical tools to give chartists a more complete picture.

RRG on StockCharts

Chartists can find links to RRG Charts in the “Charting Tools” section in the right navigation column on most web pages at StockCharts. A link to RRG charts can also be found at the bottom of the Free Charts page. There is an outstanding article available [here](#) that describes how to use all the controls.

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17860
17840
17820
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2:00 3:00 11Feb 11:00 12:00 1:00 2:00 3:00

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