

Episode 6

Can the Market Multiply and Divide? Non-Proportional Thinking in Financial Markets

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Kelly Shue's research challenges the conventional wisdom that size is the fundamental determinant of volatility and offers investors a window on an under-appreciated driver of asset price movements.

This Conversation is based on

Can the Market Multiply and Divide? Non-Proportional Thinking in Financial Markets (March 2018)

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[Read in SSRN](#)




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 Conversations

 Jonathan Kelly, thanks for joining us. You recently wrote an article called “Can the Market Multiply and Divide? Non-Proportional Thinking in the Financial Markets.” Can you explain to us what non-proportional thinking means?


 Kelly *Proportional thinking means thinking in percent or proportions, and non-proportional thinking means thinking in dollar units. Investors in financial markets should always be thinking in percent or return units, because the share price of a financial security has no inherent meaning. The share price is determined simply by how many shares of stock are divided into a company's market capitalization.*


Why might investors start thinking in dollars when they shouldn't? Because media outlets, such as the Wall Street Journal, have historically reported only the dollar price in share movements relative to the previous day, and modern iPhone apps, for example, show the daily price change by default, so the user has to go into settings and turn on return units.

To see how non-proportional thinking can distort financial returns, let's consider two otherwise identical stocks: one is \$20 per share and the other is \$30 per share. The \$20 per share stock's market capitalization is divided into more shares, so it has a lower share price.

Suppose a piece of news arrives: both companies have a new CEO, who is known to be skilled. What should happen is that both the \$20 stock and the \$30 stock go up in value by the same percentage return, but if investors think in dollar units, they might reason that both stocks should go up in value by one dollar each.


This leads to a return overreaction for the lower-priced stock because the return is just a dollar divided by the share price. The same thinking is also going to lead to a return underreaction for the higher-priced stock, and all of this is going to lead to mispricing in financial markets.


 Jonathan Can you talk us through some of those implications? You have mentioned underreaction and overreaction. It sounds like it has to do with volatility.

 Kelly *In non-proportional thinking, when investors react to news in dollars, it leads to greater return reactions for lower-priced stocks and that translates into higher return volatility for the lower-priced stocks and lower return volatility for higher-priced stocks.*

The same predictions actually apply to measures of market beta. For aggregate market news, when investors react in dollar units, the lower-priced stock is going to move too much with the market, leading to a higher beta. And this is what we find in the data. All else equal, lower-priced stocks have much higher volatility as well as higher market beta.


The cleanest evidence of this is right after a stock split. After a stock split nothing fundamental about the stock changes, but the share price is half of what it was before. If investors continue to react to news in dollar units, then the return reactions are going to be too big after the split. That's what we observed. The day after a stock split, volatility is 20% to 30% higher than it used to be, beta is also higher by about 30%, and it stays higher for the next six months to one year after the split.

 Jonathan That seems related, although not identical, to what we know about small-cap companies.


 Kelly *It is well known that small-cap stocks have higher volatility and market beta. This has led many investors to believe that maybe size is a fundamental determinant of risk as measured by volatility or beta. We show that size is actually not a fundamental determinant of risk; the relationship is actually all due to the correlation between size and price.*


If we hold price constant across size, we find no changes in volatility in the data. If we hold size constant and just change share price, which is what happens after splits or reverse splits, then we see a really big change in volatility and beta. This is suggesting that price is fundamentally determining volatility and beta in the market.

 Jonathan Interesting. Are there any other empirical puzzles that can be addressed by your findings?

 Kelly *Recognizing that investors suffer from non-proportional thinking helps us understand a host of puzzling features in the asset pricing data. For example, we can better explain the leverage effect puzzle. This puzzle is about a really strong negative relation between past returns and future volatility. What happens when past returns have been poor? It just means that the share price of a stock is lower than it used to be, and if investors are reacting to news in the same dollar units as they did before and now the share price is lower due to the negative return, then volatility is going to be much higher.*

Another puzzle that non-proportional thinking can help us understand is the phenomenon of long-run and short-run reversals. A reversal is when a past winner tends to underperform or a past loser tends to outperform. Previous returns tend to revert. This could happen if, for example, investors overreact to news in dollar units for lower-priced stocks. Eventually that mispricing should be corrected, which means the return should move in the opposite direction after the initial reaction. That's what we find in the data: long-run reversals as well as short-run reversals are very much driven by lower-priced stocks, holding size constant.


 Jonathan For the more practically oriented students of your work, what can they do to remedy this bias or to take advantage of it in capital markets?

 Kelly *To remedy the bias, we have to be really careful to think in the right units, so even though we're constantly being exposed to media tickers showing dollar changes, we should always think about what the price change means in percent. We should try to find financial statements that show information in percent.*

The bias could also be remedied if media outlets and stock tracking apps showed returns rather than prices by default. This type of reporting and the bias that results is pretty similar to the recent reporting when the Dow had the largest point drop in history. Point drop is another meaningless unit; it was not the largest drop in percentage units.

Some simple ways to possibly profit from this phenomenon would be for an investor, who seeks to benefit from reversals, to tilt those investments toward lower-priced stocks, because those are the stocks that drive reversals.

The other way to benefit from this bias would be a pure volatility bet. An investor could buy straddles that pay off when realized volatility is higher than what is estimated by option traders.

 Jonathan Thank you for explaining what non-proportional thinking is and how it impacts a stock's volatility and beta as well as the small-cap effect and mean reversion.

 Kelly *Thank you very much.*

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