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#virus

Quant Insights

Have Low Vol Strategies Lived Up to Expectations during COVID-19?

- **Low-volatility strategies are expected to be a defensive instrument in times of market stress and historically have outperformed the market in those periods.**
- **We examined three popular low vol strategies: Low Beta, Min Vol, and Low Vol. In previous sell-offs, they worked as expected by outperforming the S&P 500. However, over the past four weeks they all declined roughly as much as the S&P 500 or even more.**
- **Although low vol strategies have historically been a defensive play, the decline in the recent episode has been so steep and large that correlation became essentially one, meaning that nothing is low risk anymore.**

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Low-volatility strategies are by construction less risky than the market. Thus, these strategies are designed to be a defensive play and are expected to do better during sell-offs. In fact, as a result of their performance during previous bear markets, low vol equity products have experienced rapid growth over the past decade, attracting increasing assets under management globally.

A sudden increase of COVID-19 outbreaks around the world have caused global financial turmoil, making the past four weeks momentous. US and global stock prices dropped about 30%. US equity volumes reached unprecedented highs, with volume doubling its longer term average, further confirming the extent of the selling pressure. The VIX ended on March 16, 2020, at its all-time high of 82.69, and experienced some of its largest daily moves in more than 20 years (as we discussed in Ben Dor and Rosa, *2020*).[1] The magnitude of the VIX inversion validates the breadth of market disruptions, given that a similar level of VIX backwardation dates back to the financial crisis. The recent deepening sell-off in US stocks provides an opportunity to assess whether low vol strategies perform as expected in extreme market environments.

Low volatility equity investing comes in many forms. This note considers two versions of long-only low vol strategies for US equities. The first version is a "Low Beta" strategy that goes long stocks with low CAPM beta to the market. The second version consists of low vol strategies based on tradable products: IShares Min Vol US (ticker: USMV) and Invesco Low Vol US (ticker: SPLV), which are the two largest low vol ETFs in the US.[2] The Low Beta strategy can be implemented; however, its returns are gross of transaction costs. In contrast, the returns of the ETFs are net of transaction costs and fully attainable, as they already take into account all practical trading aspects. Figure 1 reports their performance in four recent sell-off episodes, i.e., during August 2015, January 2016, December 2018, and over the past four weeks (highlighted in light blue). To gauge the magnitude of the sell-off, the first row displays the S&P 500 cumulative over the same period. The second row displays the performance of the Low Beta strategy. For both ETFs, Figure 1 reports the ETF cumulative return (in %), its assets under management (AUM, in $bn) and the fund flows (in $mn and as a percentage of AUM). The AUM of these ETFs have grown substantially, ranging between 2.5 (SPLV) and 6.6 (USMV) times in less than five years. In previous sell-offs, low vol strategies behaved as expected. Although those strategies were not immune from stock declines, they tended to outperform the market by falling less than the S&P 500. However, in the past four weeks, Low Beta and USMV declined roughly as much as the S&P 500, while SPLV underperformed the index by declining more than 32%. In contrast to past market declines, this time both ETFs have also experienced large asset redemptions, ranging between 1% (USMV) to 15% (SPLV).

[1] Ben Dor, A., Rosa, C., 2020. *Exploiting 'Volmageddon' With Systematic Intraday Strategies*. *Barclays Research*, 13 March 2020.

[2] The Low Beta strategy is comprised of the 100 S&P 500 members with the lowest trailing 5-year CAPM beta on the market. The portfolio is rebalanced at the end of each month, and returns are equally weighted. USMV tracks the MSCI USA Minimum Volatility, an index that aims to reflect the performance characteristics of a minimum variance strategy applied to the large and mid-cap US equity universe. SPLV tracks the S&P 500 Low Volatility Index, which is comprised of the 100 S&P 500 members with the lowest trailing 12-month volatility. In contrast with iShares USMV, SPLV does not consider correlation among stocks, so it produces a basket of low vol stocks, not a minimum volatility portfolio.

FIGURE 1

The Performance of Low Vol Strategies During Market Sell-offs Since 2011

Asset / ETF	Sample	08/17/2015-08/25/2015	12/29/2015-2/11/2016	12/03/2018-12/24/2018	2/24/2020-3/20/2020
S&P 500 (SPX)	Cum. Ret. (%)	-11.2	-12.0	-15.7	-30.9
Low Beta	Cum. Ret. (%)	-8.7	-2.8	-12.7	-30.3
IShares Min Vol US (USMV)	Cum. Ret. (%)	-9.5	-6.1	-12.7	-30.2
	AUM (bil $)	6	7	19	35
	Fund Flows (mil $)	553	1,444	1,258	-189
	Fund Flows (% of AUM)	9.6	18.9	6.8	-0.9
Invesco Low Vol US (SPLV)	Cum. Ret. (%)	-11.3	-6.4	-11.7	-32.5
	AUM (bil $)	5	6	8	11
	Fund Flows (mil $)	-94	526	321	-1,776
	Fund Flows (% of AUM)	0.1	9.1	3.9	-14.9

Source: Bloomberg, Compustat, Barclays Research

Next, we examine whether the low vol sensitivity to the market over the past four weeks was similar with that in previous downturns. To do so, we estimate the following regression:

$$r_t = \alpha + \beta_1\ SP500_t + \beta_2\ SP500_t\ PastDeclines_t + \beta_3\ SP500_t\ CurrentDecline_t$$

where r_t is the daily low vol strategy return, SP500 is the daily return on the S&P 500, and PastDeclines and CurrentDeclines are dummy variables that take value 1 in previous and current stock market declines, as defined in Figure 1. The coefficient β_1 captures the sensitivity to the S&P 500 in normal times, whereas the coefficients β_2 and β_3 measure to what extent the sensitivity has changed in past and current declines.

The regression results for the period 2011-2020 are reported in the first three columns of Figure 2. The start date is October 20, 2011, and corresponds to the first trading date for USMV. Although SPLV started trading earlier on May 5, 2011, for consistency we use the same sample period for all three low vol strategies. We indicate with stars when the coefficients are significant at the 10% level or better. We find that the R^2 coefficients, measures of the goodness of fit, range between 76% (for Low Beta) and 88% (for USMV), thus suggesting that the S&P 500 returns explain most of the time series variation of these low vol strategies. In normal times the sensitivity to the S&P 500 is below 1, as expected in long-only low vol portfolios. Although the coefficient β_2 is always positive, it is never significantly different from zero. Hence, in previous market declines, the sensitivity was similar to that of normal times. Over the past four weeks, the association between low vol strategies and the stock market increased substantially. For instance, a decline of 1% in the S&P 500 is associated with a decline of 0.98% in SPLV (i.e., $\beta_1 + \beta_3$).[3] The bottom of Figure 2 tests whether the sensitivity to the stock market equals 1 in past and current declines, respectively. These tests reject the null hypotheses for past declines. However, for Low Beta and SPLV the sensitivity was not only higher than normal, but also insignificantly different from 1.

To investigate the sensitivity of low vol strategies during the financial crisis, the last column in Figure 2 considers an extended sample period from 2000 to 2020. The S&P 500 declined about 40% between September 19, 2008, and November 11, 2008, thus a similar magnitude to that seen in the recent crash. Also in 2008, the sensitivity of the low beta

[3] Given the bond-like characteristics of low vol portfolios, as a robustness check we include the change in 10-year Treasury rates as an additional explanatory variable. We find that although the coefficient is significantly different from zero, the magnitude of the effect is small. Hence, the steep decline in interest rates of the past four weeks, with the Federal Reserve slashing the federal funds target rate by 150bp to nearly to zero in two surprise moves, on March 3 and March 15, and launching a massive $700bn quantitative easing program to shelter the economy from the effects of the virus, has contributed little to boost low vol returns. This result is consistent with Ben Dor and Rosa (*2020*), who show that low vol portfolios display little sensitivity to interest rates. For more details, see Ben Dor, A., Rosa, C., 2020. *The Sensitivity Of Low Vol Strategies To Interest Rates: Myth Or Reality? Barclays Research*, 10 February 2020.

strategy increased significantly compared with normal times. Although, in contrast to today, in 2008 the Low Beta strategy outperformed the market, declining 30%. Furthermore, the sensitivity to the market remained below 1 (as indicated in Figure 2, the last row).

FIGURE 2

Low Vol Sensitivity to the S&P 500 in Normal Times and in Market Downturns

	Sample:	2011-2020			2000-2020
Coeff.	Variable	Low Beta	USMV	SPLV	Low Beta
β_0	Constant	0.02***	0.01*	0.01	0.03***
β_1	$S\&P500_t$	0.63***	0.71***	0.69***	0.64***
β_2	$S\&P500_t$ * Past Declines 2015, 2016, 2018	0.08	0.07	0.12	0.07
β_3	$S\&P500_t$ * Current Decline 2020	0.31***	0.16***	0.29***	0.29***
β_4	$S\&P500_t$ * Decline 2008				0.13***
	R^2	0.76	0.86	0.81	0.78
	Observations	2,038	2,026	2,038	4,902
	H_0: $\beta_1+\beta_2 = 1$ (p-value)	0.00	0.00	0.03	0.00
	H_0: $\beta_1+\beta_3 = 1$ (p-value)	0.24	0.00	0.79	0.20
	H_0: $\beta_1+\beta_4 = 1$ (p-value)				0.00

Note: The sample period is October 21, 2011, to March 20, 2020, for the first three columns, and January 3, 2000, to March 20, 2020, for the last column. The start date is determined by USMV data availability. The econometric method is Ordinary Least Squares. "Past Declines 2015, 2016, 2018" is a dummy variable that takes value 1 for the periods August 17, 2015 to August 25, 2015, December 29, 2011 to February 11, 2016, and December 3, 2018 to December 24, 2018, and 0 otherwise. "Current Decline 2020" is a dummy variable that takes value 1 between February 24, 2020 and March 20, 2020, and 0 otherwise. "Decline 2008" is a dummy variable that takes value 1 between September 19, 2008 to November 20, 2008, and 0 otherwise. The superscripts ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively, and are based on autocorrelation-consistent Newey-West standard errors.
Source: Bloomberg, Compustat, Barclays Research

In sum, we find that low-volatility strategies have historically been a defensive play. However, the decline in the recent episode has been so steep and large that correlation became essentially one, meaning that nothing is low risk anymore. To avoid the increase in correlation during times of extreme market stress, investors may benefit from combining low vol portfolios with protective deep out-of-the-money put options.

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