

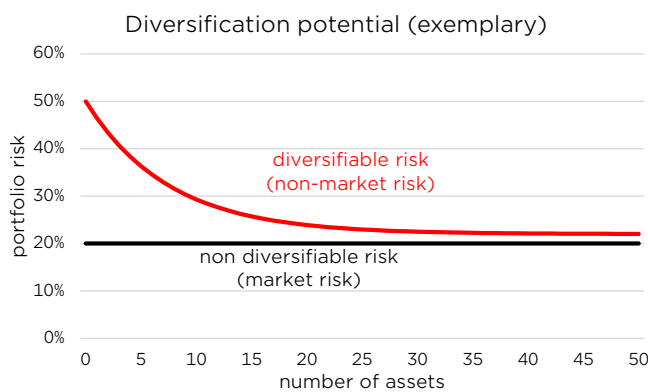


Economic Situation and Strategy

18 August 2023

Investment strategy: It depends on the portfolio size

If you want to optimize your investment strategy, there are numerous parameters available. The geographic or sectoral orientation can be adjusted to the general economic conditions and the investment style can also be modified. The portfolio construction also plays an important role. In addition to the question of whether the portfolio weights should be optimized with regard to return or risk characteristics, the question of the "right" portfolio size is also important. But is the number of titles actually decisive for a successful investment strategy?



From a purely theoretical point of view, the portfolio risk can be reduced with an increasing number of (not fully correlated) stocks. The basic idea is trivial: If the value of the assets does not show perfect synchronization, the diversification effects can be used to reduce the market-independent risk (see figure). However, the additional diversification effect through the inclusion of further titles decreases. In extreme cases, the portfolio consists of all stocks on the market (e.g. a benchmark), so that the mar-

ket-independent risk is eliminated. What remains, however, is the market-dependent risk, which cannot be "diversified away" any further. The stock market adage "don't put all your eggs in one basket" sums up the diversification effect very nicely.

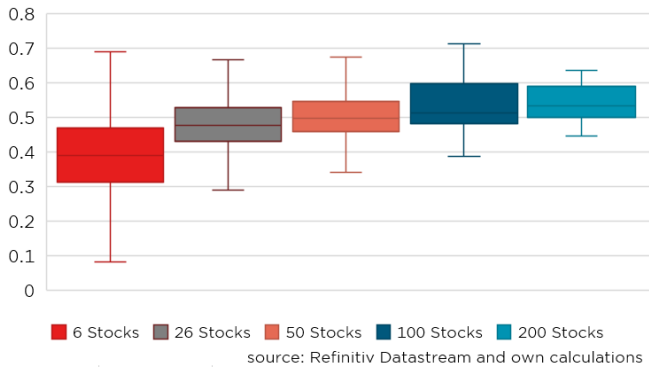
However, the portfolio risk is not the only decision variable when aligning one's own portfolio. What if the risk decreases, but the return falls disproportionately? In addition, everyone has a personal risk tolerance: while an investor can handle a volatility of 20 percent very well, another investor can only tolerate ten percent. So it cannot be generalized that the "optimal" number of stocks has to be relatively high in order to reduce the portfolio risk as much as possible. Since we do not know the utility function of all investors, we choose so-called risk-adjusted return indicators as a decision criterion for choosing a reasonable number of portfolio titles. These reflect the return per risk unit and have the advantage that investment strategies with different risks can be compared.

What do our simulation results imply?

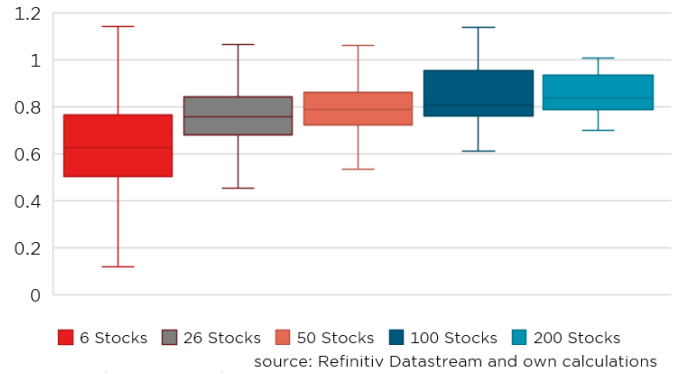
So, should portfolios be composed of relatively few or many stocks in order to optimize risk-adjusted return measures? Whenever such questions need to be answered in the context of the financial market, it is standard practice to carry out simulations. With their help, investment hypotheses can be checked under strictly defined framework conditions. For our question, we simulated the value development of 1,000 random equally weighted portfolios consisting of six, 26, 50, 100 and 200 stocks. Half of the portfolios consist of shares from the S&P 500 and the other half of shares from the STOXX Europe 600.

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Box-Plot: Sharpe Ratio by Portfolio Size



Box-Plot: Sortino Ratio by Portfolio Size



Let's start with what is probably the most well-known risk-adjusted return indicator: the Sharpe ratio. The box plot above shows the distribution of the Sharpe ratios that result from the simulated performance of each of the 1,000 portfolios. Two observations are immediately apparent: First, the median increases steadily with the size of the portfolio. If the median Sharpe ratio for the six-stock portfolio is less than 0.4, it is 0.53 for the 200-stock portfolio. This is not a quantum leap, but it is a significant improvement. Is the improvement only due to a reduction in portfolio risk? This is not the case, as the median annualized return of the six-stock portfolio is around 100 basis points lower (see table). At the same time, the median portfolio volatility of the small portfolio is around 330 basis points higher than that of the 200-stock portfolio.

Simulation results: median value for different portfolio sizes

Ratio	6 Stocks	26 Stocks	50 Stocks	100 Stocks	200 Stocks
Return p.a.	8.0%	8.5%	8.6%	8.7%	9.0%
Volatility p.a.	20.5%	17.9%	17.5%	17.3%	17.2%
Downside Volatility p.a.	12.7%	11.3%	11.1%	11.0%	10.9%
Maximum Drawdown	56.8%	54.4%	54.0%	53.9%	53.8%
Tracking Error	12.8%	8.1%	6.9%	6.2%	5.9%
Sharpe Ratio	0.39	0.48	0.50	0.51	0.53
Sortino Ratio	0.63	0.76	0.79	0.81	0.84
Calmar Ratio	0.14	0.16	0.16	0.16	0.17

Source: Refinitiv Datastream and own calculations. Benchmark: 50% S&P 500, 50% STOXX Europe 600. Period: January 2000 to April 2023.

The second central observation can be determined from the range of the simulated Sharpe ratios. The wide range of risk-adjusted returns for the six-stock portfolio is striking. In this case, it means that with "luck" a relatively high Sharpe ratio of almost 0.7 was achieved, but with "bad luck" the risk-adjusted return ratio fell below 0.1. However, for our simulated portfolios with more stocks, the range decreases significantly. A portfolio consisting of 100 stocks also achieved a Sharpe ratio of 0.7 in the "lucky case", but in the worst case it still came to a Sharpe ratio of just under 0.4. From this it follows that the risk of achieving a poor return and risk profile decreases significantly in our simulation as the number of stocks increases.

Volatility - measured as the standard deviation of returns - is a symmetric risk measure. This means that the fluctuations of both positive and negative returns are perceived as equally "bad". However, it is often only the fluctuations in negative returns that cause concern. In this case, the standard deviation is replaced by the so-called downside volatility and the Sortino ratio is considered instead of the Sharpe ratio. How do the different portfolios perform in this regard? The basic statements regarding the Sharpe ratio are confirmed. Here, too, the risk-adjusted return figure increases as the portfolio size increases. The decisive factor is again - thanks to the additional diversification effects - the falling portfolio risk with a simultaneously higher return. Furthermore, the range of the Sortino Ratio decreases with increasing portfolio size, suggesting that the likelihood of portfolios with poorer risk and return profiles decreases.

What is our conclusion?

Our simulation results speak for themselves: With a portfolio that is too small, it is almost impossible to achieve more attractive risk-adjusted returns. In practice, there are a few successful "high conviction" portfolio managers who have in-depth industry and company knowledge and who achieve remarkable results with a concentrated portfolio. However, this number becomes smaller and smaller the longer the observation period. Our simulation also underscores the fact that, from a purely statistical point of view, it is considerably more difficult to achieve a better return and risk profile with a small portfolio. So anyone who believes that they can successfully build long-term wealth with a portfolio consisting of just a few stocks is fooling themselves. On the other hand, if you want to speculate and have "play money" left over, you can of course do extreme stock picking and focus on a very few stocks. In this case, however, the associated higher risk due to a lack of diversification effects should not come as a surprise.

Market data

	As of	Change versus				
	18.08.2023 08:38	11.08.2023 -1 week	17.07.2023 -1 month	17.05.2023 -3 months	17.08.2022 -1 year	30.12.2022 YTD
Stock markets						
Dow Jones	34475	-2,3%	-0,3%	3,2%	1,5%	4,0%
S&P 500	4388	-1,7%	-3,0%	5,5%	2,7%	14,3%
Nasdaq	13317	-2,4%	-6,5%	6,5%	2,9%	27,2%
DAX	15677	-1,0%	-2,4%	-1,7%	15,0%	12,6%
MDAX	27519	-2,0%	-0,7%	0,4%	-0,1%	9,6%
TecDAX	3079	-1,6%	-3,8%	-4,2%	-1,7%	5,4%
EuroStoxx 50	4228	-2,2%	-3,0%	-2,2%	12,6%	11,4%
Stoxx 50	3906	-1,7%	-0,5%	-3,1%	6,5%	7,0%
SMI (Swiss Market Index)	10885	-1,8%	-0,8%	-4,8%	-2,2%	1,4%
Nikkei 225	31451	-3,1%	-2,9%	4,5%	7,6%	20,5%
Brasilien BOVESPA	114982	-2,6%	-2,7%	5,0%	1,1%	4,8%
Russland RTS	1029	2,8%	1,9%	-1,0%	-9,5%	6,0%
Indien BSE 30	64901	-0,6%	-2,5%	5,4%	7,7%	6,7%
China CSI 300	3795	-2,3%	-1,9%	-4,2%	-10,0%	-2,0%
MSCI Welt	2902	-2,4%	-4,0%	2,9%	2,8%	11,5%
MSCI Emerging Markets	974	-2,4%	-5,2%	-0,2%	-4,1%	1,8%
Bond markets						
Bund-Future	130,62	-85	-237	-485	-2350	-231
Bobl-Future	115,37	-2	-24	-257	-1056	-38
Schatz-Future	105,00	1	14	-64	-449	-42
3 Monats Euribor	3,80	15	40	65	345	191
3M Euribor Future, Dec 2023	3,94	3	-5	25	216	33
3 Monats \$ Libor	5,64	1	6	27	266	87
Fed Funds Future, Dec 2023	5,41	0	5	78	208	77
10 year US Treasuries	4,23	6	43	65	133	40
10 year Bunds	2,62	3	17	28	161	6
10 year JGB	0,63	4	16	26	44	21
10 year Swiss Government	1,10	1	14	10	59	-51
US Treas 10Y Performance	573,00	-0,9%	-3,6%	-4,9%	-7,6%	-1,2%
Bund 10Y Performance	530,54	-0,6%	-1,6%	-2,2%	-11,1%	1,0%
REX Performance Index	430,00	-0,7%	-0,6%	-1,9%	-7,1%	-0,6%
IBOXX AA, €	3,84	10	16	25	173	25
IBOXX BBB, €	4,65	10	9	7	144	-4
ML US High Yield	8,70	17	28	-2	107	-27
Convertible Bonds, Exane 25	6620	0,0%	0,0%	0,0%	-3,8%	0,0%
Commodities						
MG Base Metal Index	377,62	-0,5%	-2,8%	-1,8%	-5,8%	-9,7%
Crude oil Brent	84,27	-2,9%	7,4%	9,4%	-10,2%	-0,8%
Gold	1892,20	-1,3%	-3,1%	-4,5%	7,3%	4,2%
Silver	22,68	0,0%	-8,8%	-4,3%	14,9%	-4,5%
Aluminium	2108,50	-0,8%	-4,6%	-8,7%	-12,5%	-10,3%
Copper	8200,85	-0,7%	-3,2%	-0,7%	3,5%	-2,0%
Iron ore	105,64	0,3%	-5,5%	-1,6%	0,1%	-5,1%
Freight rates Baltic Dry Index	1247	10,5%	16,2%	-12,5%	-10,5%	-17,7%
Currencies						
EUR/ USD	1,0883	-1,1%	-3,1%	0,5%	7,1%	2,0%
EUR/ GBP	0,8552	-0,9%	-0,4%	-1,5%	1,4%	-3,6%
EUR/ JPY	158,00	-0,6%	1,7%	6,5%	15,0%	12,3%
EUR/ CHF	0,9554	-0,7%	-1,0%	-2,0%	-1,4%	-3,0%
USD/ CNY	7,2833	0,6%	1,5%	4,1%	7,4%	5,5%
USD/ JPY	145,84	0,6%	5,1%	5,9%	8,0%	11,2%
USD/ GBP	0,79	-0,1%	2,8%	-2,0%	-5,3%	-5,4%

Source: Refinitiv Datastream

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