23 February 2024

CO_2 reduction in portfolios: the long march into the unknown

Over the past few years, many asset managers and capital collectors have committed themselves to reducing the carbon footprint of their portfolios. If you want to keep your portfolio on a 1.5-degree path, you currently have to reduce the carbon footprint of your portfolio by around eight percent per year.

The idea behind this is as follows: There is a certain (unfortunately not perfectly determinable) level of CO_2 concentration in the air that is just compatible with global warming of 1.5 degrees. This concentration is used to derive a residual budget of CO_2 emissions that is still permissible in order not to miss this concentration and thus the temperature target. The math behind this is ultimately a simple rule of three and can basically be calculated by any student from the seventh grade onwards. If we want to have exhausted the remaining emissions budget by 2050, for example (we could also aim for 2060, for example; the total quantity of emissions is relevant for the climate, not the distribution over time, as CO_2 remains in the atmosphere for 200 years after it is emitted anyway), according to current calculations, emissions must be reduced by around eight percent p.a. so that we end the year 2050 at around zero in order to then achieve a CO_2 concentration in the atmosphere that is just tolerable with the total emissions.

If all companies were to align their economic activity with this target, the world would be on a 1.5-degree path and the footprint of every portfolio would automatically follow this path. However, as this is not the case, it can also appear sensible and expedient for an investor who is indirectly responsible for emissions with his investments in bonds and equities to trim his portfolio to a 1.5-degree path by reallocating. This is because the investor will then indirectly (!!) finance those companies that are compatible with this desired path. In addition to the voluntary commitments, however, there are also increasing regulatory requirements that suggest adherence to such a path. It is reasonable to assume that the intensity of the regulator's intervention will continue to increase and that compliance with a 1.5 degree target could increasingly become a standard requirement for many investors, even if this means gradually moving away from the strategic allocation that was actually intended.

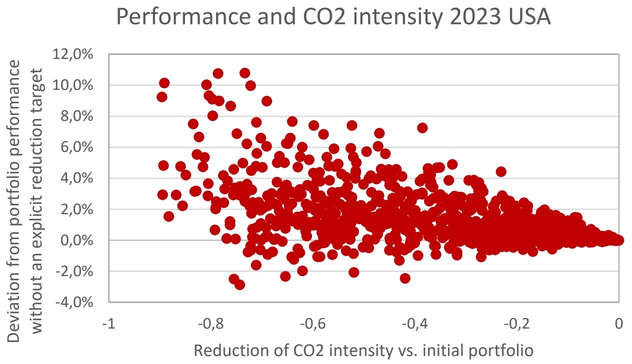
CO_2 reduction is very easy for investors in the first few years

If you now start to reduce the carbon footprint of portfolios, this can initially be achieved very simply by (partially) selling very carbon-intensive positions. It is not uncommon to find a few stocks in the portfolio that together account for 50 percent of all CO_2 emissions. Here it is easy to reduce the carbon footprint without significantly affecting the performance or risk of the overall portfolio after the (partial) sale of these stocks. But what happens when the "low-hanging-fruits" of the portfolio adjustment have been processed after a few years? It is already intuitively clear that at a certain point you run the risk of running into an invisible wall. However, when this happens depends heavily on the extent to which the portfolio companies succeed in reducing their CO_2 emissions themselves. Ideally, the CO_2 emissions of the companies held in the portfolio will fall so sharply in the coming years that major shifts will not be necessary. However, experience shows that this is not possible. The reality is as follows: Listed companies grow faster than entire economies. It is therefore particularly difficult for these fast-growing companies to achieve the desired reduction targets year after year. This would only be possible if the CO_2 intensity of production were to be reduced by significantly more than 10 percent year on year - a completely unrealistic idea. In real life, all that is left are shifts that present portfolio construction with ever greater challenges year after year.

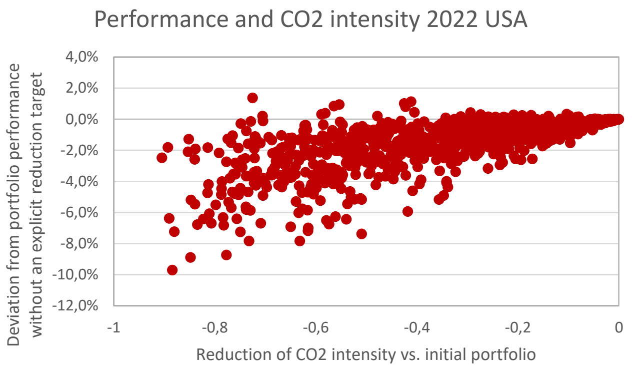
Absolute and relative risks literally explode

But how big are these challenges? This question is not easy to answer, because nobody knows the future. However, the past is not such a bad guide on capital markets, especially when it comes to risks. Our test setup was as follows: For the years 2018 to 2023, we used the respective historical index members of the STOXX 600 Europe and the STOXX 600 North America year by year to simulate portfolios that could have actually existed in exactly the same way. In a first step, around 80-160 shares per region were randomly selected from the 600 shares in each of the two indices to represent the region in the portfolio. The shares were weighted according to their market capitalization; the portfolios were always fully invested. The CO_2 footprint was determined for each of the portfolios created in this way. In a second step, the CO_2 footprint was reduced to an extent selected by the random generator. The reduction was achieved by reallocating or selling the previously selected shares of the original portfolio without CO_2 restriction. The reallocations (and in very rare cases the complete sales) were carried out in such a way that the expected tracking error to the respective benchmark (STOXX 600 Europe or STOXX 600 North America) as well as to the original portfolio was minimized. For each region and each year, 2,000 runs were calculated and it was recorded how the relative performance to the original portfolio, the tracking error to the benchmark and the absolute risk compared to the original portfolio changed as a function of the CO_2 reduction.

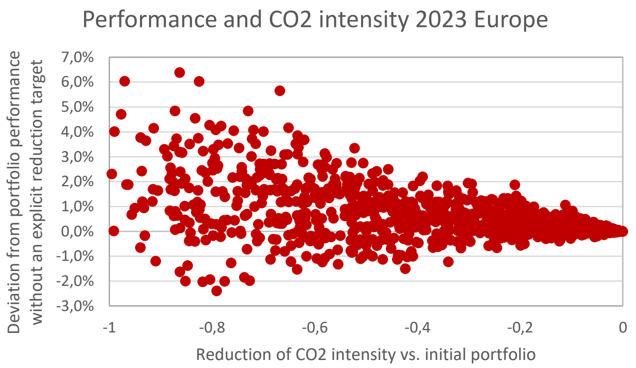
The results are very consistent across all years and both regions. This shows that reductions in the CO_2 footprint of more than 50 percent compared to the original portfolio lead to massive deviations in performance compared to the original portfolio.



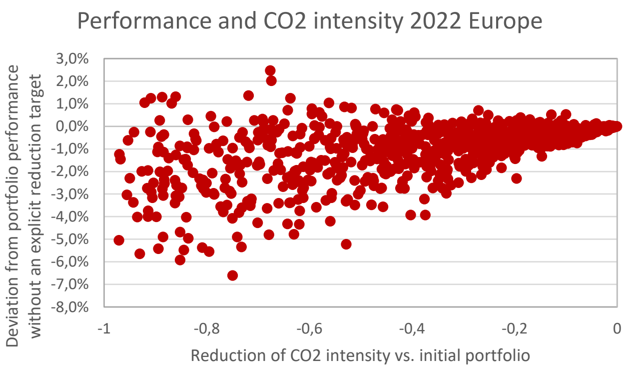
There are years in which a gradual reduction in CO_2 leads to a certain outperformance, but there are similarly many years in which exactly the opposite is the case, sometimes even to a very significant extent.



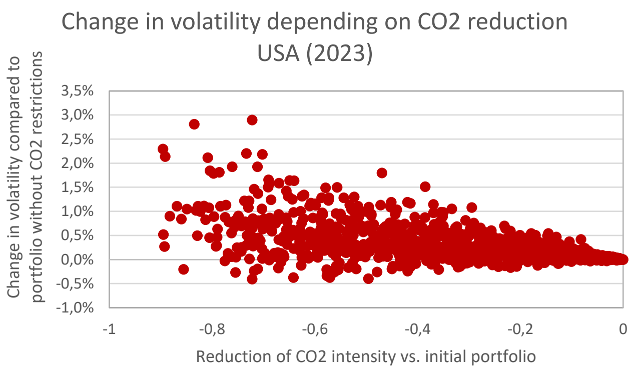
For example, portfolios in the USA in 2022 (Canada is also represented in the index with a few stocks) lost an average of around six percentage points in performance if the carbon footprint was reduced by 80 percent. Among the 2,000 simulated portfolios, there were only very few portfolio structures that benefited at all from a CO_2 reduction in that year.

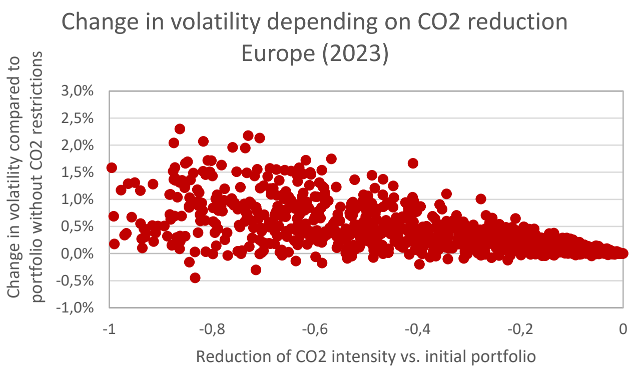


A similar picture emerged in Europe; more important than the respective sign of out- or underperformance, however, is the enormous extent of the deviation from the performance of the original portfolio in percentage points after just one year! Many investors are probably not even aware of the relative risks they are taking when they describe the path to climate-neutral portfolios via reallocations.



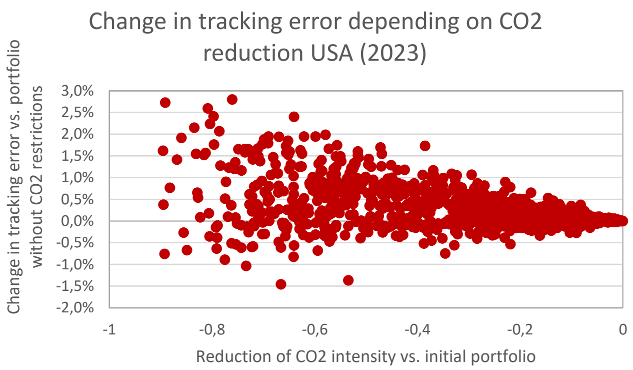
In addition to relative risks, there are of course also absolute risks, which have systematically increased in almost all simulation runs over all years as soon as CO_2 restrictions were introduced in portfolios.

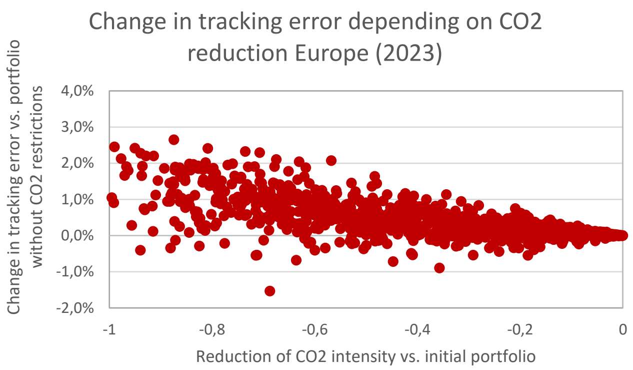




In addition, our calculations show that CO_2 restrictions in portfolios not only lead to significant deviations in performance compared to the original portfolio; the tracking error to the respective benchmark compared to the tracking error to the benchmark of a portfolio without restrictions also systematically increases as soon as CO_2 restrictions are introduced. There are years in which the tracking error to the benchmark can very easily increase by two or more percentage points if the CO_2 reduction is more than 50 percent.

That doesn't sound dramatic at first. But if you consider that the average of the tracking error calculations of all simulated portfolios without restrictions was 3.5 percent, a surcharge of 2.5 percent or more on this tracking error is a kind of catapult start into a completely different relative risk dimension!





In summary, it can be said that the decision to embark on the 1.5 degree path as an investor is not a sure-fire success. Investors will soon come across the limits of portfolio construction. This is particularly true if the portfolios deviate significantly from the targeted strategic allocation at the end of the process. It is not uncommon for exactly such allocation structures to have been derived with great effort in asset-liability management studies, which then lead to absurdity in real life. However, there is a solution to this problem - more on this in one of the next issues of Economics and Strategy.

Dr. Christian Jasperneite

Market data

Stock marktes	As of 23.02.2024 10:16	Change versus 16.02.2024 -1 week	22.01.2024 -1 month	22.11.2023 -3 months	22.02.2023 -1 year	29.12.2023 YTD
Dow Jones	39069	1,1%	2,8%	10,8%	18,2%	3,7%
S&P 500	5095	1,8%	5,0%	11,8%	27,7%	6,8%
Nasdaq	16042	1,7%	4,4%	12,4%	39,4%	6,9%
DAX	17366	1,5%	4,1%	8,8%	12,8%	3,7%
MDAX	25919	-0,9%	0,7%	-0,8%	-8,9%	-4,5%
TecDAX	3395	-0,4%	2,7%	8,1%	5,0%	1,7%
EuroStoxx 50	4854	1,9%	8,3%	11,5%	14,4%	7,4%
Stoxx 50	4295	0,7%	5,4%	8,6%	9,2%	4,9%
SMI (Swiss Market Index)	11429	1,0%	1,4%	5,5%	1,1%	2,6%
Nikkei 225	39099	1,6%	7,0%	16,9%	44,3%	16,8%
Brasilien BOVESPA	130241	1,2%	2,9%	3,3%	21,5%	-2,9%
Russland RTS	1064	-3,9%	-6,4%	-7,6%	14,5%	-1,8%
Indien BSE 30	73158	1,0%	2,1%	10,8%	22,5%	1,3%
China CSI 300	3490	3,7%	8,4%	-1,5%	-15,0%	1,7%
MSCI Welt	3330	1,4%	4,4%	10,8%	21,9%	5,1%
MSCI Emerging Markets	1029	1,3%	6,8%	4,7%	4,8%	0,6%
Bond markets						
Bund-Future	132,58	-38	-189	136	-174	-464
Bobl-Future	115,98	-57	-165	-80	-1	-330
Schatz-Future	105,10	-23	-78	4	-21	-144
3 Monats Euribor	3,95	4	4	4	126	6
3M Euribor Future, Dec 2024	2,99	8	38	-11	-9	69
3 Monats $ Libor	5,58	1	0	-6	66	-1
Fed Funds Future, Dec 2024	4,64	11	56	10	88	81
10 year US Treasuries	4,35	4	25	-8	40	48
10 year Bunds	2,47	9	21	-6	-1	47
10 year JGB	0,72	-1	9	-2	22	10
10 year Swiss Government	0,87	-5	-2	-10	-57	17
US Treas 10Y Performance	582,70	-0,1%	-1,5%	1,7%	0,3%	-3,0%
Bund 10Y Performance	549,48	-0,2%	-1,0%	1,6%	3,5%	-2,8%
REX Performance Index	440,78	-0,3%	-0,3%	1,3%	2,7%	-1,6%
IBOXX AA, €	3,44	1	10	-29	-18	37
IBOXX BBB, €	4,03	-1	4	-49	-44	27
ML US High Yield	7,99	-6	0	-71	-81	19
Commodities						
MG Base Metal Index	382,66	1,4%	2,5%	0,4%	-11,0%	-2,1%
Crude oil Brent	82,86	-0,4%	3,6%	1,0%	2,8%	6,7%
Gold	2017,70	0,4%	-0,2%	1,2%	9,9%	-2,3%
Silver	22,76	-2,4%	1,1%	-3,7%	5,2%	-6,1%
Aluminium	2154,74	-2,0%	1,8%	-1,1%	-9,3%	-8,1%
Copper	8499,50	1,1%	3,0%	3,0%	-6,6%	0,4%
Iron ore	127,82	-1,1%	-5,6%	-1,6%	1,6%	-6,3%
Freight rates Baltic Dry Index	1752	8,8%	15,4%	-0,2%	159,9%	-16,3%
Currencies						
EUR/ USD	1,0819	0,5%	-0,7%	-0,8%	1,6%	-2,1%
EUR/ GBP	0,8541	-0,2%	-0,2%	-2,1%	-3,0%	-1,4%
EUR/ JPY	163,05	0,7%	1,3%	0,5%	13,8%	4,3%
EUR/ CHF	0,9534	0,5%	0,8%	-1,1%	-3,4%	3,0%
USD/ CNY	7,1985	-0,1%	0,0%	0,5%	4,4%	1,3%
USD/ JPY	150,53	0,2%	1,6%	0,7%	11,6%	6,7%
USD/ GBP	0,79	-0,6%	0,4%	-1,6%	-4,7%	0,7%

Source: Refinitiv Datastream

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