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BANK

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Index tracking with a few stocks: is that possible?

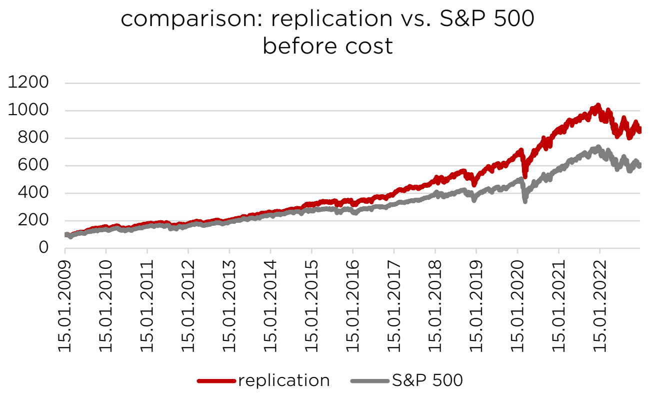
In recent years it has not been easy as a portfolio manager to beat indices such as the S&P 500 or the Nasdaq 100. It is difficult to assess whether this is a purely temporary phenomenon or a structural issue. The fact is that only a few active funds and portfolios have been able to achieve significant outperformance compared to the highly capitalized US stock indices in recent years. This was partly due to the fact that the particularly highly capitalized stocks in the major indices performed so extremely well that outperformance in an active portfolio would almost only have been possible if these stocks had been overweighted again - a decision that one under risk and diversification aspects could hardly have justified.

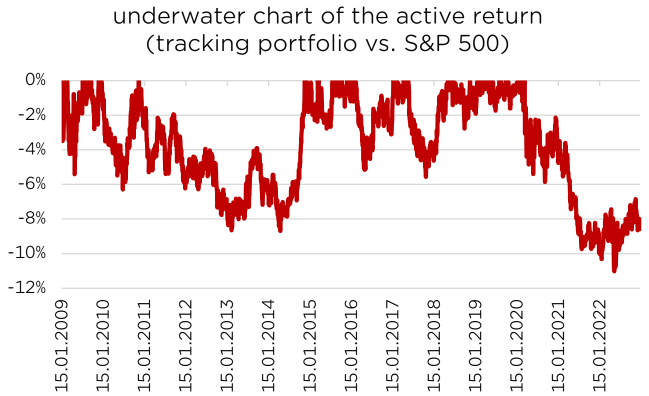
This observation almost inevitably leads to the consideration of whether one would not be better off simply investing in indices and ETFs. However, this decision may also have unfavorable consequences in the future, because with an investment in indices, due to the system, you are always backing yesterday's "winners". In market-capitalized indices, stocks that have performed particularly well in the past are always heavily weighted. If there is a regime change, in which new and different macro factors become value drivers than in the previous period, this type of index construction can be directed against the investor with full force: In this case, the values that were previously benefited above average from the macro environment. This speaks in favor of not investing in indices completely without reflection, but rather still making selection decisions. However, in order not to allow the deviations from the performance of the index to become too large, there is a lot to be said for a portfolio construction that has exactly that goal. But how well can a portfolio be constructed that works with a comparatively small number of stocks and thus takes into account the restrictions of a so-called high-conviction portfolio in which hundreds of stocks cannot be used to track the S&P 500 for example?

There is no trivial answer to this question. This is because the resulting performance of such a portfolio always consists of two components - namely the upstream selection and the downstream portfolio construction. In addition, iterative processes exist here in real life; it may be the case that a stock that was preselected is not considered at all in the portfolio construction, while the optimizer would like to consider stocks (or bonds) in the portfolio construction that are not initially part of the preselection were. It is almost inevitable that compromises and discretionary decisions must be made here, which cannot be tested in a meaningful way based on rules. But what can be tested is a portfolio construction in its purest form: the question here is how closely a comparatively concentrated stock portfolio can be brought up to a benchmark if there are no other limiting factors. A case is therefore tested in which the selection component is initially excluded in order to check how much the tracking error can be reduced compared to the benchmark – knowing that an integration of selection decisions in this process will increase the tracking error again in real life.

To carry out this test, we proceeded as follows. We have decided to use the S&P 500 as the selection universe and benchmark to be tracked, since this very broad index is particularly difficult to replicate due to a concentrated portfolio and accordingly represents a special "hardship case", which makes the quality of the portfolio construction particularly good. In our back calculation, we recalculated and adjusted the tracking portfolio every six months from January 2009, with the optimizer being given the task of limiting the portfolio to a maximum of 35 stocks. Only shares that were part of the S&P 500 at the time were allowed for optimization. Accordingly, there is no survivorship bias anywhere. In addition, the optimizer was only provided with information at any point in time that would actually have been available at that point in time. In addition, the resulting new tracking portfolio was not implemented immediately, but always a few days later in order to take into account realistic implementation periods here as well.

The whole calculation is actually not quite as trivial as it might sound at first. Because there is simply no optimizer that finds a solution directly on its own that leads to the desired number of titles (here 35) without detours and in a closed system of equations. At this point, heuristics inevitably come into play, which in our case have the following form: In a first step, the 100 largest stocks in each case from the S&P 500 are selected. Based on these 100 values, the optimizer now has the task of weighting these values in such a way that the tracking error compared to the S&P 500 is minimized. One constraint to be observed is that the beta of the resulting portfolio has a value of exactly one to the S&P 500. In addition, we have indirectly ensured through additional specifications that the factor profile of the resulting portfolio does not deviate significantly from the benchmark. Typically, the optimizer concludes that around 70 to 80 stocks are needed to best reflect the S&P 500. From now on, it gets computationally intensive: In the loops that follow, the stock that previously had the lowest weight is always excluded from the optimization process. This exercise then continues until 35 shares remain. If you repeat this process every six months up to the current edge (and wait about one night of computing time for the results), the following picture emerges.





The result is initially almost impressive: the performance of the replication portfolio seems to be highly parallel to the S&P 500, and there is also an unintended outperformance. But the picture is deceptive. The underwater chart of the active return shows unequivocally that phases of significant underperformance are also to be expected. And it should be clear that this result shows the lower limit of possible deviations from the benchmark, because any selection activity is likely to further increase the tracking error. Our conclusion is therefore as follows: With a suitable portfolio construction, even very concentrated portfolios can definitely be brought up to a benchmark. But even with the most complex approaches, the statistical properties of 500 stocks cannot simply be perfectly replicated by 35 stocks - anything else would have been surprising, though. The potential of portfolio construction is therefore limited to a certain extent - but you should still use it!

Market data

Stock marktes	As of 17.05.2023 12:51	Change versus 10.05.2023 -1 week	14.04.2023 -1 month	16.02.2023 -3 months	16.05.2022 -1 year	30.12.2022 YTD
Dow Jones	33012	-1,5%	-2,6%	-2,0%	2,4%	-0,4%
S&P 500	4132	-0,1%	-0,1%	1,0%	3,1%	7,6%
Nasdaq	12343	0,3%	1,8%	4,1%	5,8%	17,9%
DAX	15944	0,3%	0,9%	2,6%	14,2%	14,5%
MDAX	27318	-0,2%	-1,7%	-5,9%	-5,6%	8,8%
TecDAX	3222	-0,4%	-2,8%	-1,9%	4,8%	10,3%
EuroStoxx 50	4317	0,2%	-1,7%	0,5%	17,1%	13,8%
Stoxx 50	4040	0,5%	-0,1%	2,5%	12,1%	10,6%
SMI (Swiss Market Index)	11472	0,2%	1,1%	2,5%	-1,7%	6,9%
Nikkei 225	30094	3,3%	5,6%	8,7%	13,4%	15,3%
Brasilien BOVESPA	108194	0,7%	1,8%	-1,6%	0,0%	-1,4%
Russland RTS	1026	-2,6%	4,3%	13,1%	-12,6%	5,7%
Indien BSE 30	61561	-0,6%	1,9%	0,4%	16,2%	1,2%
China CSI 300	3960	-0,9%	-3,2%	-3,3%	0,1%	2,3%
MSCI Welt	2802	-0,7%	-0,8%	0,4%	4,0%	7,7%
MSCI Emerging Markets	979	0,0%	-2,1%	-3,2%	-2,8%	2,4%
Bond markets						
Bund-Future	135,30	-66	91	76	-1873	237
Bobl-Future	118,15	-26	94	206	-962	240
Schatz-Future	105,75	-11	33	43	-474	33
3 Monats Euribor	3,38	24	49	98	379	149
3M Euribor Future, Dec 2023	3,65	7	-4	1	221	4
3 Monats $ Libor	5,33	-1	7	43	388	56
Fed Funds Future, Dec 2023	4,58	19	1	-49	166	-6
10 year US Treasuries	3,53	9	1	-34	64	-30
10 year Bunds	2,31	2	-12	-13	138	-25
10 year JGB	0,37	-5	-3	-13	13	-4
10 year Swiss Government	0,95	-9	-15	-44	20	-66
US Treas 10Y Performance	604,30	-0,8%	0,1%	3,5%	-1,5%	4,2%
Bund 10Y Performance	542,29	-0,4%	1,0%	1,8%	-9,6%	3,2%
REX Performance Index	439,57	0,2%	0,9%	1,9%	-5,2%	1,6%
IBOXX AA, €	3,56	9	-4	0	167	-4
IBOXX BBB, €	4,54	10	1	16	172	-16
ML US High Yield	8,70	11	30	13	106	-27
Convertible Bonds, Exane 25	6620	0,0%	0,0%	0,0%	-3,0%	0,0%
Commodities						
MG Base Metal Index	381,10	-4,0%	-9,3%	-9,4%	-16,6%	-8,9%
Crude oil Brent	75,31	-1,5%	-12,8%	-11,6%	-34,1%	-11,3%
Gold	1988,35	-1,7%	-0,5%	8,5%	9,7%	9,5%
Silver	23,71	-6,5%	-6,1%	9,5%	10,3%	-0,2%
Aluminium	2254,50	-0,2%	-4,5%	-4,2%	-19,6%	-4,0%
Copper	8074,24	-4,3%	-10,6%	-10,2%	-12,8%	-3,5%
Iron ore	106,84	0,0%	-10,3%	-14,3%	-19,6%	-4,0%
Freight rates Baltic Dry Index	1476	-10,0%	2,9%	178,5%	-52,2%	-2,6%
Currencies						
EUR/ USD	1,0828	-1,1%	-2,1%	1,2%	3,9%	1,5%
EUR/ GBP	0,8698	0,0%	-1,7%	-2,1%	2,4%	-2,0%
EUR/ JPY	148,28	0,1%	1,1%	3,5%	9,8%	5,4%
EUR/ CHF	0,9734	-0,4%	-0,9%	-1,4%	-7,1%	-1,1%
USD/ CNY	6,9941	0,8%	1,8%	1,8%	3,0%	1,3%
USD/ JPY	136,39	1,5%	1,9%	1,8%	5,6%	4,0%
USD/ GBP	0,80	1,4%	0,0%	-3,5%	-1,6%	-3,4%

Source: Refinitiv Datastream

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