Efficient portfolio structures: Important for risk, more important for performance!

There was a time when a portfolio manager would face ridicule for recounting efforts not only to fill portfolios with attractive individual securities but also to take care that they stood in the context of a sensible, diversifying portfolio. The critics of such an approach would argue the attempt to design especially efficient portfolios was ultimately only of academic significance. Although such mathematically based procedures allow risk to be reduced marginally in the ideal case, customers would not notice the reduction in "real life" and therefore would not be willing to pay for it. Long-term performance is much more important, they would say, and that depends more on the securities chosen than on whether the structure meets academic efficiency criteria. One might as well skip the portfolio optimization bit.

Of course, times have changed. Today, no portfolio managers would claim this quite crude line of reasoning as their own. Nevertheless, it is often not clear even now to investors and portfolio managers how relevant a highly efficient portfolio structure is – and that in respect to both risk *and* performance.

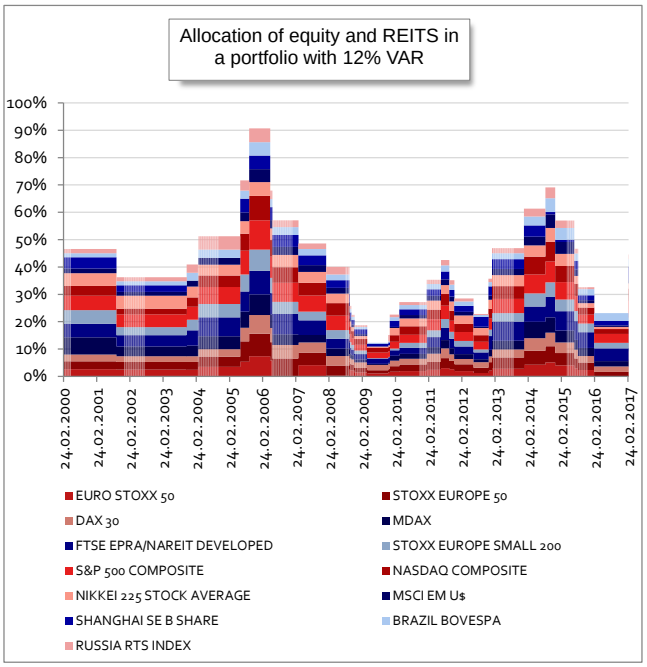
Below, we demonstrate this thesis based on an analysis that uses all means to gear one portfolio for efficiency and diversification and leaves another as inefficient and undiversified as possible. So that the two portfolios can otherwise be sensibly and fairly compared with one another, we have ensured that both exhibit similar risk budgets. The effects of portfolio design on performance and other key figures can thus be clearly illustrated.

The details are as follows. We have set up a model that enables us to realistically calculate the performance of different portfolio strategies in retrospect. We ensure that the model never has any information that would not also have been available in "real time." The model can invest simultaneously in up to 24 markets (stocks, bonds, and commodities in diverse countries and regions) by way of ETFs. The allocation and hence weighting of these 24 markets is reviewed daily. In each review, we calculate whether the prescribed risk budget (in this case, 12% loss over one year with a probability of 95%) can be maintained with the portfolio structure at that time. This calculation is performed on the basis of the latest observed correlations and volatility of the markets involved. If the risk budget can no longer be maintained, a reallocation is made. At this point, the two portfolios part ways.

In the portfolio geared to efficiency and diversification, a new portfolio structure is sought that satisfies two optimization criteria. The first is risk parity, which requires the portfolio be managed in such a way that among all possible portfolios, the one is chosen that comes closest to the notion of risk parity among the individual positions. That sounds complicated, but ultimately it is not at all. In simplified terms, this method of portfolio management leads to markets being weighted in such a way that each contributes about the same risk for the overall portfolio. The resulting structure is deemed robust and well-diversified by both theoreticians and practitioners.

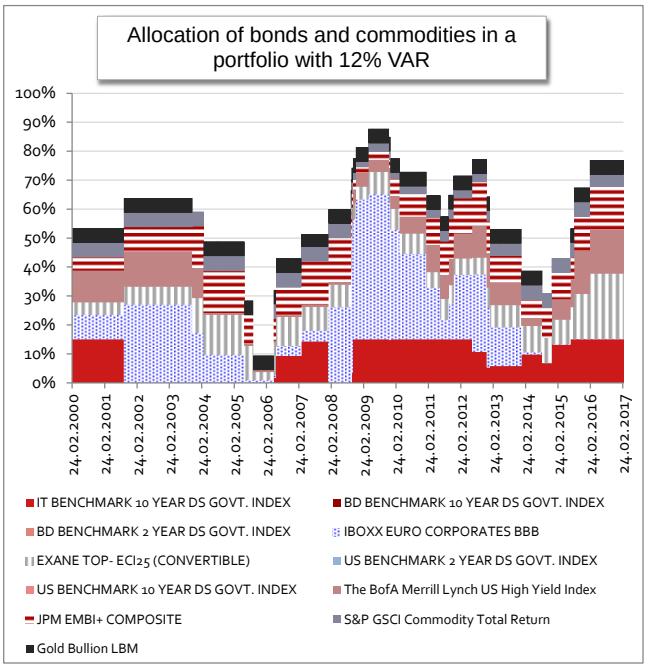
However, we also supplement the criterion of risk parity with the criterion of maximum diversification. Here, the algorithm aims at weighting the markets in such a way that the opportunities for diversifying risk are utilized to the mathematically maximum extent. In combination, the two criteria ensure resulting portfolio structures that are also intuitively comprehensible in practice. So, the danger does not exist of choosing exotic allocation structures that would be theoretically justifiable, but would meet with resistance in practice.

While efficiency, robustness, and diversification are emphasized in the first portfolio, exactly the opposite happens in the comparison portfolio. Given otherwise identical restrictions and risk parameters, a portfolio is sought there in which individual markets make very different risk contributions and at the same time markets are heavily weighted that do not jointly yield any diversification effects.



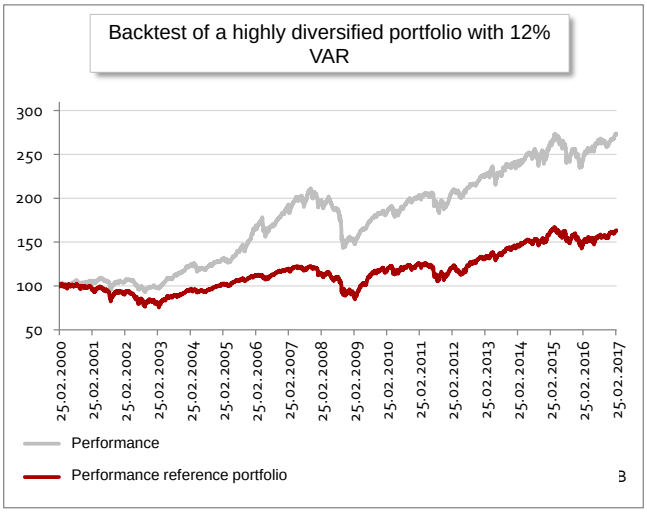
The result in the efficient portfolio is the stock allocation depicted in the chart above and a value at risk (VAR) of 12%.

Analogously, we arrive at tactical movements in the bond allocation, which are shown in the chart below.

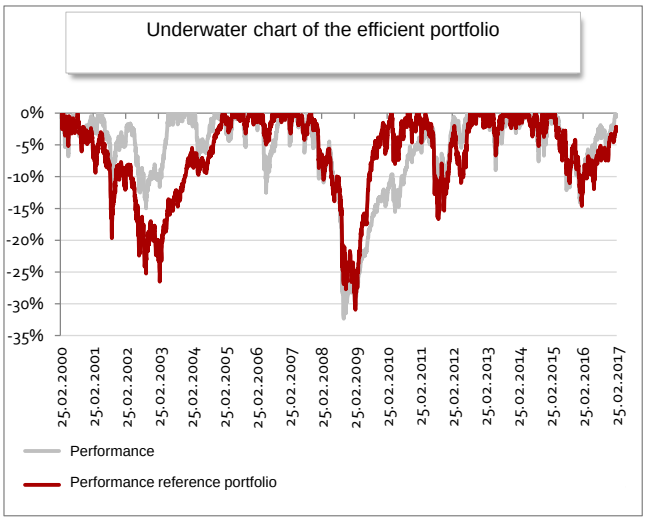


It is important to understand here that the changes in allocation structure have nothing to do with a change in market assessment. That kind of "opinion" or forecast does not exist on this approach.

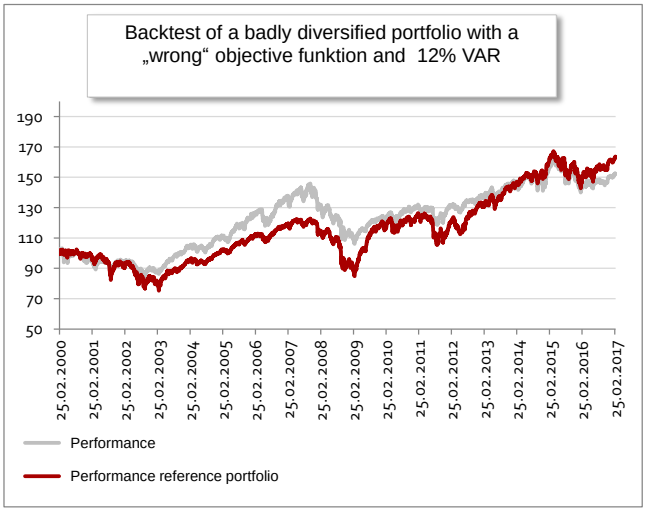
The changes in the statistical properties of the observed markets' performance are the only relevant and decisive thing. The resulting performance of the efficient portfolio would have been gratifyingly positive after costs, although it is not easy to find a point of reference. That is because no "natural" benchmark exists for this kind of portfolio design. Every choice would be arbitrary in a certain sense, since a benchmark exhibits a fixed weighting of different assets classes, while only risk ratios play a role in our concrete portfolios, and not statistical quotas for stocks and bonds.



For the sake of clearer presentation, we have chosen a benchmark for the calculations consisting of 35% Euro STOXX 50 and 65% corporate bonds (IBOXX BBB), which in retrospect exhibits almost exactly the same risk characteristics as our efficient portfolio, as the underwater chart below shows.



Now it gets interesting. How by contrast did the portfolio do in which everything was geared to inefficiency, risk disparity, and minimal diversification, but with the same risk parameters and basic data? We thought performance should turn out poorer in this case, which would be evidence that efficient portfolios must lead to higher performance given the same risk parameters.



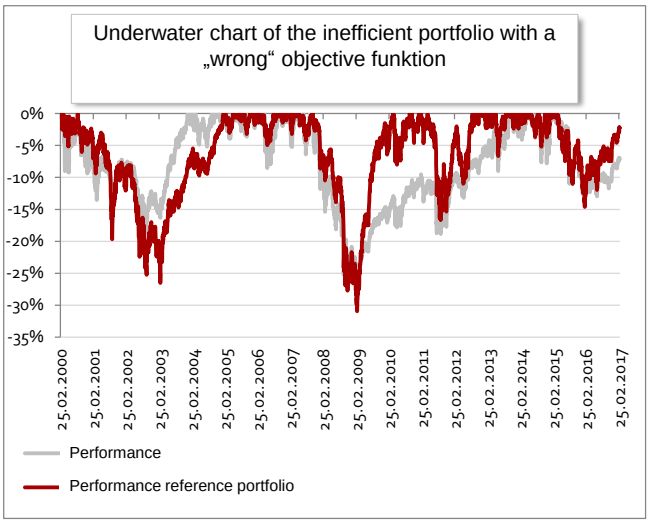
That is definitely the case, as the charts show. Although the sought VAR is more or less maintained, performance is worse – and that even given worse recovery parameters. Since one would also have expected this theoretically, the result was initially not surprising.

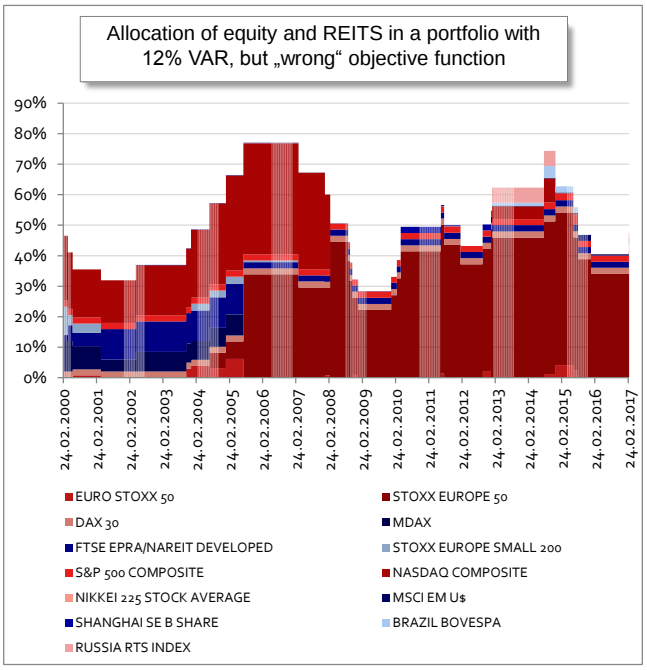
What really did surprise us was the extent of the poor performance. We would have expected performance to be slightly worse, but instead significantly worse performance may be shown. In fact, we would not have thought that global multi-asset portfolios with a similar risk structure based on a forecast-free approach could exhibit such different performance at all.

Moreover, the inherently "poor" diversification may be seen graphically in the structure of allocation over time, which exhibits significantly heavier "bets" and relies on high concentration instead of a wide spread. This concentration leads to poor diversification properties and, because of the parameter of maintaining a VAR of 12%, it tends to

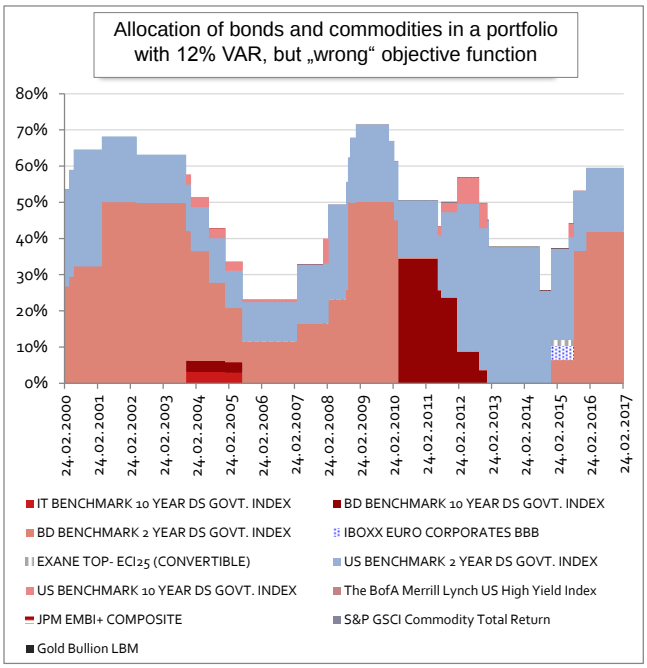
reduce the admixture of risky assets, which cannot be afforded to a greater extent given the poor diversification.

That is exactly what leads to the poorer performance, providing convincing evidence of how higher-quality diversification can lead to better performance in the long run and to shorter recovery periods given the same risk parameters.





Let us consider here once again the difference between the efficient and inefficient portfolios. While both exhibit about the same volatility and the same risk budgets in the form of nearly identical VAR, the efficient portfolio's cumulative performance over the period came to about 170%, but performance in the other case was only 50%.



This huge difference in performance is surely no accident, but rather empirical evidence that modern investment processes with a view to portfolio structure are much more than academic fluff. Especially in times of low interest rates, they are practically a precondition for achieving any attractive performance at all without exaggerating risks. For, only efficient portfolio structure and portfolio management make it even possible to admix risky markets to such an extent that they can positively affect performance.

Moreover, there is another lesson one can draw from these calculations. One should be critical of portfolio strategies that rely solely on maintaining risk budgets. Our analysis shows there is a broad spectrum of possible portfolio structures that all maintain the prescribed risk budgets. Any asset manager who fixates on maintaining risk budgets can keep that promise and still fail on a grand scale by producing performance that remains drastically below what is possible.

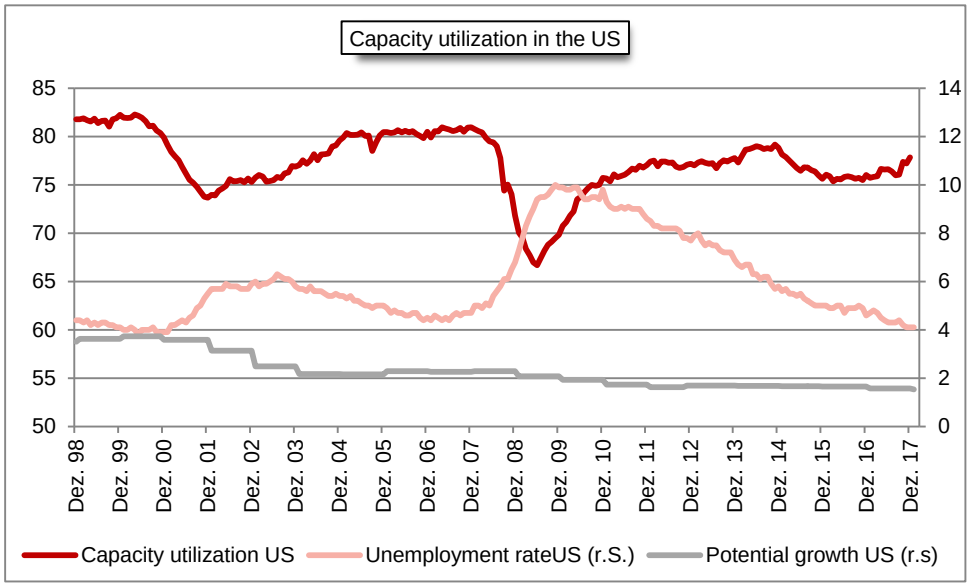
Of course, we are not suggesting there is a patent recipe for producing performance at the push of a button. Respect for the markets requires that. However, there is a patent recipe that will very likely lead to long-term failure - and that is doing without efficient portfolio diversification.

Weekly outlook for January 22-26, 2018

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb	Release
DE: ZEW economic expectations	17.0	17.6	18.7	17.4	17.6		January 23
DE: ZEW current conditions	87.9	87.0	88.8	89.3	89.5		January 23
DE: PMI, manufacturing – flash	60.6	60.6	62.5	63.3	63.1		January 24
DE: PMI, services – flash	55.6	54.7	54.3	55.8	55.6		January 24
DE: GfK consumption climate	10.9	10.8	10.7	10.7	10.8	10.8	January 25
DE: Ifo business climate index	115.3	116.8	117.6	117.2	117.3		January 25
DE: Ifo business expectations	107.5	109.2	111	109.5	109.6		January 25
DE: Ifo current conditions	123.8	124.9	124.5	125.4	125.5		January 25
EUR19: Consumer confidence – flash	-1.2	-1.0	0.1	0.5	0.6		January 23
EUR19: PMI, manufacturing – flash	58.1	58.5	60.1	60.6	60.4		January 24
EUR19: PMI, services – flash	55.8	55.0	56.2	56.6	56.4		January 24
EUR19: M3, y/y	5.2%	5.0%	4.9%	5.0%			January 26

MMWB estimates in red

Chart of the Week: Rising capacity utilization in the USA



The US economy grew strongly last year at a rate of 2.5%. The latest number for industrial production growth of 0.9% m/m shows an intact uptrend. In line with good growth in the industrial sector, capacity utilization is also rising. Capacity utilization describes the relationship between realized industrial production and productive potential. At 77.9%, it has reached the highest level since February 2015. Although this shows that capacity utilization is rising with economic growth, the level remains significantly below full utilization despite the second-longest US economic upswing on record. What can the reason for that be? The unemployment rate in the United States is 4.1% and thus below the non-accelerating inflation rate of unemployment (NAIRU), which stands at 4.7%. This indicates that full employment has been achieved, which would hardly be compatible with 20% underutilization. However, the participation ratio, i.e., the portion of the labor force actually employed or seeking employment, is 62.7% and thus below the long-term average of about 65%. We may infer from this that the "real" unemployment rate is significantly higher at 7.5%, which helps explain the underutilization. This is probably also a reason for the low inflation rate in the United States. That is not necessarily a bad sign, but it does mean that despite the long economic upswing, capacities exist for further upward development. Nevertheless, these free capacities should not be overestimated, as the past has shown capacity utilization seldom surpasses 80%. That is presumably because fixed assets are systematically overestimated in the calculation. Overall, however, the picture remains that the US economy is equipped for further growth.

Stock marktes	As of 19.01.2018 13:51	Change versus 04.01.2018 -1 week	08.12.2017 -1 month	10.10.2017 -3 months	29.12.2017 YTD
Dow Jones	26018	3,8%	6,9%	14,0%	5,3%
S&P 500	2798	2,7%	5,5%	9,7%	4,7%
Nasdaq	7154	1,1%	4,6%	8,6%	3,6%
DAX	13423	1,9%	2,0%	3,7%	3,9%
MDAX	27429	2,5%	4,8%	6,2%	4,7%
TecDAX	2703	3,1%	7,5%	8,2%	6,9%
EuroStoxx 50	3647	2,2%	1,5%	1,3%	4,1%
Stoxx 50	3251	1,5%	2,3%	1,8%	2,3%
SMI (Swiss Market Index)	9496	-0,1%	1,9%	2,5%	1,2%
Nikkei 225	23808	1,3%	4,4%	14,3%	4,6%
Brasilien BOVESPA	81292	3,4%	11,8%	5,7%	6,4%
Russland RTS	1271	4,7%	13,5%	12,0%	10,1%
Indien BSE 30	35512	4,5%	6,8%	11,2%	4,3%
China Shanghai Composite	3489	3,1%	6,1%	3,1%	5,5%
MSCI Welt (in €)	2197	0,9%	1,4%	4,5%	2,1%
MSCI Emerging Markets (in €)	1228	1,3%	5,8%	6,1%	3,6%
Bond markets					
Bund-Future	163,14	155	-34	166	146
Bobl-Future	131,19	-43	-140	-9	-42
Schatz-Future	111,90	-5	-29	-25	-7
3 Monats Euribor	-0,33	0	0	0	0
3M Euribor Future, Dec 2017	-0,25	0	3	-3	0
3 Monats $ Libor	1,70	0	16	35	1
Fed Funds Future, Dec 2017	1,29	-63	-52	-34	-1
10 year US Treasuries	2,63	17	24	28	22
10 year Bunds	0,59	15	28	14	16
10 year JGB	0,08	3	5	2	3
10 year Swiss Government	0,02	18	18	7	15
US Treas 10Y Performance	574,93	-0,8%	-1,2%	-1,2%	-1,1%
Bund 10Y Performance	607,52	-0,4%	-1,6%	-0,2%	-0,5%
REX Performance Index	478,71	-0,3%	-1,2%	-0,8%	-0,4%
US mortgage rate	0,00	0	0	0	0
IBOXX AA, €	0,68	0	14	-7	0
IBOXX BBB, €	1,20	0	10	-8	-3
ML US High Yield	6,12	5	-7	14	-3
JPM EMBI+, Index	832	-0,6%	-0,1%	-0,7%	-0,5%
Convertible Bonds, Exane 25	7470	-0,2%	1,1%	2,9%	1,0%
Commodities					
CRB Spot Index	441,15	1,0%	2,3%	3,1%	2,0%
MG Base Metal Index	358,69	-1,0%	8,9%	5,0%	0,0%
Crude oil Brent	68,68	0,9%	8,4%	20,9%	3,1%
Gold	1334,50	1,3%	6,9%	3,2%	2,4%
Silver	16,97	-1,3%	7,7%	-1,2%	-0,2%
Aluminium	2167,25	-3,0%	8,8%	1,4%	-3,9%
Copper	7112,75	-0,5%	8,8%	6,1%	-1,3%
Iron ore	72,50	-2,8%	5,9%	20,5%	1,7%
Freight rates Baltic Dry Index	1139	-15,1%	-33,1%	-19,7%	-16,6%
Currencies					
EUR/ USD	1,2263	1,6%	4,4%	4,0%	2,3%
EUR/ GBP	0,8841	-0,8%	0,6%	-1,1%	-0,4%
EUR/ JPY	135,73	-0,1%	1,9%	2,4%	0,5%
EUR/ CHF	1,1757	-0,1%	0,5%	2,0%	0,5%
USD/ CNY	6,3990	-1,5%	-3,3%	-2,7%	-1,6%
USD/ JPY	111,44	-1,2%	-1,8%	-0,9%	-1,1%
USD/ GBP	0,72	-2,3%	-3,6%	-4,7%	-2,5%

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