

The Denominator Effect



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The year 2022 was not a good one

throughout much of the capital markets, as both equity and bond markets fell significantly. The S&P 500 total return (including dividends) showed a decline of 18.1%, while the Bloomberg US Aggregate Bond Index had a total return of -13.0%. At the same time, however, the NCREIF Fund Index—Open End Diversified Core Equity (ODCE) recorded a respectable total return (net of fees) of 6.5%. The first thing these numbers reveal is the benefit of diversification, the most fundamental reason that institutional investors allocate to real estate—when other markets are down, real estate is often up (or vice versa)—smoothing portfolio returns and reducing volatility.

However, the returns of 2022 also brought up another issue: the denominator effect. On average, globally, institutional investors have a target 10.4% allocation to real estate.¹ When equity and bond markets fall, investors see the value of their overall portfolios (the denominator) decline. Even if real estate values (the numerator) do not change, the percentage allocation to real estate in the portfolio increases as real estate becomes the same size slice in a smaller pie. If real estate returns are positive, as they were in 2022, the effect is even larger. By the end of 2022, the denominator effect left many institutional investors with real estate allocations above target, limiting their ability to deploy new capital to the asset class or even looking for ways to reduce exposure to get allocations back into line with strategic target allocations.

Strategic asset allocation targets (usually expressed as a range on each asset class) are a fundamental and important part of the investment process, chosen to manage risk, optimize diversification, and generate better long-run investment performance. Hence, portfolio managers must take departures from target allocations seriously. However, the illiquidity of private market real estate can make adjusting exposure a lengthy, and potentially expensive, process. Many portfolio managers face the question of how much time and effort to dedicate to countering the denominator effect—i.e., adjusting the real estate portfolio

in reaction to changes in the more volatile public markets that moved the real estate allocation off target.

The denominator effect observed in 2022 began to reverse through early 2023, with the S&P 500 changing course and returning 7.5% in Q1, the bond market up 15.0%, but the ODCE beginning to recognize declines in property values and returning -3.4% (net) in the first three months of the year. This alleviated the pressure on many investors to take actions to reduce real estate exposure. Although the denominator effect that arose in 2022 has at least partially reversed (and this appears likely to continue through the remainder of 2023), the denominator effect is an evergreen issue of importance to investors—every time a major dislocation hits the public capital markets, worries about the denominator effect and what it means for real estate investment demand are discussed. Although the most recent episode is already reversing, the time will come again when the market worries about the denominator effect. Because of that, in this article, I take a quick look at the denominator effect historically and how important or not important it is for investors to adjust allocations quickly in response to it.

Long-Run Implications of Rebalancing

Before considering different approaches to rebalancing portfolios to target allocations, looking at general long-run implications of rebalancing is informative. Consider a portfolio that was formed at the beginning of 1978 (the earliest existing real estate return data) and initially had 10% allocated to real estate (represented by the ODCE index), with the remainder divided 60-40 between stocks and bonds (i.e., 54% in stocks, 36% in bonds, and 10% in real estate comprise the portfolio) as represented by the S&P 500 and Bloomberg US Aggregate Bond Index, respectively.² If the portfolio were never rebalanced, i.e., it was invested at the described allocations in 1978 and then was ignored, the allocation to real estate by the end of 1Q2023 would

1. (PREA members only) [2023 PREA Investment Intentions Survey](#)

2. In doing this, I assume that all income (dividends, interest, income from real estate) is reinvested back into the same asset class over time.

have decreased from 10% to 3%. The allocation to stocks would have increased from 54% to almost 90%. Equities are a higher-risk, higher-expected-return asset class relative to real estate and, hence, over the very long term (45 years in this example), tend to increase in value faster than does real estate, leading the percentage allocations to stocks to increase and to real estate to decrease. The first takeaway from this simple example is that, given the basic nature of the asset classes, it makes sense that the natural trend (without rebalancing) is for the allocation to real estate to fall over time. This absolutely does not mean that investors can afford to ignore above-target allocations to real estate driven by the denominator effect; a lot can happen to a portfolio before it gets to the long term. But it does mean that over long periods of time that encompass multiple cycles, there is a tendency to move toward under-allocation to real estate.

The simple example also illustrates the importance of rebalancing and strategic asset allocation targets in general. Over the 45-year period, the portfolio that was never rebalanced became more and more heavily weighted to the riskiest asset class, equities, and therefore the portfolio gradually became riskier. The volatility of quarterly returns (a measure of risk) on this “invest-and-ignore” portfolio was 6.2%. If the same portfolio were rebalanced and could be kept consistently at the original 54% stocks, 36% bonds, 10% real estate allocation every quarter, the volatility of the portfolio would have been only 4.7%. The “always-rebalanced” portfolio had almost one-quarter less risk than the “never-rebalanced” portfolio, despite both starting at the same initial allocations.

It is obvious that rebalancing toward target allocations is an important part of risk management. Over-allocations to real estate tend to correct themselves in the long run—but is the long run too long to wait? How quickly should investors act to adjust real estate allocations, or does it even matter? I look at this more closely using another simplified example in the next section.

Does It Matter How Quickly an Investor Moves to Rebalance a Real Estate Allocation?

The example above is obviously unrealistic—no investors would ever rebalance a portfolio over the course of 45 years. Likewise, at least with private market asset classes, it is virtually impossible to keep a portfolio at an exact

allocation every quarter. It takes time and effort to rebalance a real estate allocation—one reason a target allocation is usually expressed as a target with a range—i.e., a target of X% with allowable deviations of plus or minus Y%. The real question investors face is not whether they should ever rebalance or not but how quickly they should rebalance if the real estate allocation moves above (or below) the allowable upper (or lower) bound. From a portfolio view, is it better to immediately move to correct an out-of-range allocation as quickly as possible, or is moving slowly and taking the time to rebalance without panic a reasonable approach? To examine this issue, I look at a slightly more realistic example, again using returns on stocks, bonds, and real estate since 1978.

Before I describe the analysis, a number of caveats are important. Creating an example that realistically represents the impact of the denominator effect over time for every investor is impossible because every investor's situation is unique. The actual percentage allocation to real estate, the real estate assets in the portfolio, the investment vehicles used (e.g., direct investments versus closed-end funds versus open-end funds), the timing of capital commitments, and many other factors all differ across investors, creating unique circumstances that affect rebalancing strategies. So the analysis does not present a specific answer for any particular investor. Rather, my hope is that by providing a simplified (and admittedly unrealistic) example, investors may gain general insights that might prove helpful in the future when they deliberate about how to respond to denominator effect-driven over- or under-allocations to real estate.

In the first run of the analysis, I again assume a portfolio that had a target allocation of 10% to real estate, with the remaining 90% of the portfolio split between equities and bonds on a 60-40 basis. Real estate returns are represented by total net returns to the ODCE. Lacking a long history of closed-end fund returns, the analysis does not include them and their particular liquidity challenges, and I take returns to core open-ended funds (unrealistically) to represent all real estate. By focusing on total returns, I implicitly assume that all income from real estate is reinvested back into real estate; no cash allocation is considered. Initially, I assume that the real estate allocation was allowed to vary around the target in a plus or minus 1% range—i.e., the target allocation to real estate had a lower bound of 9% and an upper bound



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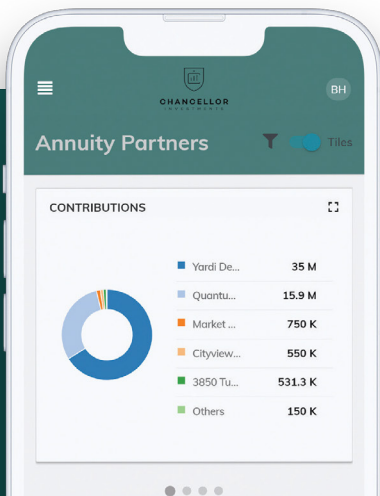
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Exhibit 1: Effect of Different Speeds of Rebalancing CRE Allocation on Portfolio, 1Q1978 to 1Q2023

Target CRE Allocation	# of Quarters to Rebalance (Straight Line) CRE After Violation of Limits	Maximum CRE Allocation Reached	Minimum CRE Allocation Reached	# of Quarters Spent Above Upper Bound	# of Quarters Spent Below Lower Bound	Most Consecutive Quarters Above Upper Bound	Most Consecutive Quarters Below Lower Bound	Annual Compound Return to Portfolio	Volatility of Quarterly Portfolio Returns
10% +/-1%	4	12.7%	7.3%	36	71	16	31	9.82%	4.66%
10% +/-1%	5	12.8%	7.1%	38	74	17	31	9.81%	4.67%
10% +/-1%	6	12.8%	7.0%	40	79	17	49	9.81%	4.67%
10% +/-1%	7	12.9%	6.9%	39	81	17	59	9.81%	4.67%
10% +/-1%	8	13.0%	6.8%	40	81	17	59	9.81%	4.67%
10% +/-1%	9	13.2%	6.7%	38	82	17	60	9.81%	4.67%
10% +/-1%	10	13.3%	6.6%	37	82	17	60	9.81%	4.67%
10% +/-1%	11	13.3%	6.4%	37	82	17	60	9.81%	4.67%
10% +/-1%	12	13.4%	6.3%	37	82	17	60	9.81%	4.67%
10% +/-1%	13	13.4%	6.2%	36	82	16	60	9.81%	4.68%
10% +/-1%	14	13.4%	6.1%	35	83	16	61	9.81%	4.68%
10% +/-1%	15	13.4%	6.1%	34	84	16	61	9.81%	4.68%
10% +/-1%	16	13.4%	6.0%	33	85	15	61	9.81%	4.68%

Source: PREA Research analysis based on data from NCREIF and Refinitiv Datastream

of 11%. I assume that, as public market securities, both bonds and equities were rebalanced every quarter and the portion of the portfolio not in real estate was always divided 60-40 between those asset classes. What drives potential deviations from target is the illiquidity of real estate and the inability to rebalance it to target immediately.

The key variable in the analysis is the speed of rebalancing real estate. I assume that when the real estate allocation exceeded its upper bound or fell below its lower bound, it was rebalanced on a straight-line basis over a set number of quarters. For example, if the number of quarters to rebalance was eight, then if the real estate allocation exceeded the upper bound in a quarter, one-eighth of the excess allocation was sold and the capital moved into stocks or bonds the next quarter. The higher the number of quarters used to rebalance real estate, the slower the investor reacted to over- or under-allocations. This variable can be thought to partially reflect the choices of the investor (“How fast do I want to move?”) but also the circumstances the investor faced (How long were queues for open-end fund withdrawals or investments? How long was the wait for return of capital from closed-end funds? How hard was liquidating direct investments or deploying

new capital?). As some delay always exists in adjusting real estate allocations, I consider speeds of real estate rebalancing, ranging from four quarters (one year) up to 16 quarters (four years). Exhibit 1 presents the results of this simulation based on quarterly data from 1978 to 1Q2023.

As an example to make sure the numbers in Exhibit 1 are clear to readers, for an allocation to real estate with a target range of 9% to 11% where any breaches of the upper or lower bound were rebalanced on a straight-line basis over four quarters (i.e., the first line of numbers), the maximum the allocation to real estate would reach over the 1Q1978 to 1Q2023 period was 12.7%, and the lowest was 7.3%. In total, the real estate allocation spent a total of 36 quarters above the 11% upper bound, and 71 quarters below the lower bound (out of a total of 181 quarters in the analysis). So the majority of the time (107 quarters out of 181), the portfolio was either over- or under-target to real estate. The longest consecutive period above the upper bound was 16 quarters (four years), and the portfolio at one point spent 31 consecutive quarters (almost eight years) below the 9% lower bound. Obviously, with these particular parameters, an investor should not expect the

Exhibit 2: Effect of Wide or Narrow Allocation Range, 1Q1978 to 1Q2023

Target CRE Allocation	# of Quarters to Rebalance (Straight Line) CRE After Violation of Limits	Maximum CRE Allocation Reached	Minimum CRE Allocation Reached	# of Quarters Spent Above Upper Bound	# of Quarters Spent Below Lower Bound	Most Consecutive Quarters Above Upper Bound	Most Consecutive Quarters Below Lower Bound	Annual Compound Return to Portfolio	Volatility of Quarterly Portfolio Returns
10% +/-1%	8	13.0%	6.8%	40	81	17	59	9.81%	4.67%
10% +/-2%	8	13.6%	6.0%	14	58	8	49	9.81%	4.68%
10% +/-3%	8	13.6%	5.4%	3	43	2	39	9.80%	4.70%
10% +/-4%	8	13.7%	4.9%	0	37	0	36	9.80%	4.74%
10% +/-5%	8	13.7%	4.2%	0	33	0	32	9.80%	4.77%

Source: PREA Research analysis based on data from NCREIF and Refinitiv Datastream

real estate allocation to always hew closely to the allocation bounds, but as I describe later, this is dependent on the exact parameters used for the rebalancing.

The long-term tendency of the real estate allocation to fall over time is evident in Exhibit 1. Instances of under-allocation are far more common than of over-allocation. The upshot for investors is that the greatest misallocation risk is to the downside for real estate. However, intuitively, under-allocation is less of a concern because it is generally easier to deploy new capital than to monetize existing positions. Further, investors being under-allocated does not present the same concerns for the overall market as do denominator effect–driven over-allocations. Hence, I concentrate on the over-allocation results in Exhibit 1, although it is the less-common situation.

Maximum real estate allocations reached were higher when rebalancing was slower. If rebalanced over four quarters, real estate reached a maximum of 12.7% of the portfolio; if rebalancing was done over two years, it reached 13.0%, and if done gradually over four years, it went as high as 13.4%. This result seems intuitive—the more slowly the rebalancing, the more likely are larger deviations from target. However, the maximum exceedance of the upper bound is not actually that different between relatively quick and relatively slow rebalancing. The number of quarters the portfolio spent above the upper bound of 11% peaked between six and eight quarters. There were actually fewer quarters over-allocated to real estate when replacement was done at a slower pace. A similar pattern holds for the results on the longest consecutive time spent over-allocated.³

Overall, it seems that, at least in this example, the speed at which an investor moved to correct over-allocations to real estate made very little difference to the overall portfolio. Perhaps most important in this, the last two columns of Exhibit 1 show the average annual (compound) return to the overall portfolio along with the volatility of quarterly returns. It is apparent that moving more quickly or more slowly to adjust real estate allocations would have made no difference at all in terms of overall portfolio risk and return over the long term.

Exhibit 1 looks only at how changing the speed of rebalancing affected the portfolio. In Exhibit 2, I repeat the analysis but this time varying the size of the real estate allocation range used, from a narrow 10% plus or minus 1%, to a wider range of 10% plus or minus 5%. I assume that any violations of the allocation bounds on real estate were rebalanced on a straight-line basis over eight quarters. The exhibit shows that, as expected, a wider range resulted in the real estate allocation reaching both higher and lower levels over the course of 1978 to 2023. But even though the real estate allocation reached higher levels, it never broke the less stringent, upper bound of the wider ranges. Again, while the wider real estate ranges produced portfolio volatility that was slightly higher, there was very little difference in portfolio risk and return across the different ranges on the real estate allocation.

3. This result might appear counterintuitive. It is driven by that fact that real estate allocations drift down over the long term, and slower rebalancing results in the average allocation to real estate being slightly lower over time. When a drop in equity markets causes a rise in the real estate allocation, it is then less likely to result in the allocation rising above the upper limit.

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Exhibit 3: Effect of Different Speeds of Rebalancing a 20% CRE Allocation, 1Q1978 to 1Q2023

Target CRE Allocation	# of Quarters to Rebalance (Straight Line) CRE After Violation of Limits	Maximum CRE Allocation Reached	Minimum CRE Allocation Reached	# of Quarters Spent Above Upper Bound	# of Quarters Spent Below Lower Bound	Most Consecutive Quarters Above Upper Bound	Most Consecutive Quarters Below Lower Bound	Annual Compound Return to Portfolio	Volatility of Quarterly Portfolio Returns
20% +/-2%	4	24.9%	14.9%	33	69	16	31	9.65%	4.19%
20% +/-2%	5	25.0%	14.6%	34	73	17	31	9.65%	4.19%
20% +/-2%	6	25.1%	14.3%	34	77	17	49	9.65%	4.19%
20% +/-2%	7	25.2%	14.0%	34	80	17	59	9.65%	4.20%
20% +/-2%	8	25.4%	13.8%	34	80	17	59	9.65%	4.20%
20% +/-2%	9	25.6%	13.6%	33	81	17	60	9.65%	4.20%
20% +/-2%	10	25.7%	13.4%	33	81	17	60	9.65%	4.20%
20% +/-2%	11	25.8%	13.2%	32	81	16	60	9.65%	4.20%
20% +/-2%	12	25.9%	13.0%	32	81	16	60	9.65%	4.21%
20% +/-2%	13	25.9%	12.8%	31	81	15	60	9.65%	4.21%
20% +/-2%	14	25.9%	12.6%	29	82	15	61	9.65%	4.21%
20% +/-2%	15	25.8%	12.5%	29	83	15	61	9.64%	4.22%
20% +/-2%	16	25.8%	12.3%	28	82	14	60	9.64%	4.22%

Source: PREA Research analysis based on data from NCREIF and Refinitiv Datastream

Although many different variations on this analysis could be performed, changing one variable or another, I limit myself here to one more example. The analyses in Exhibits 1 and 2 are based on a target allocation to real estate of 10%, within a range. To look at whether a higher allocation to real estate may change things, Exhibit 3 considers a 20% target, with a range of plus or minus 2% around the target for the allocation. The patterns for this higher real estate allocation were essentially the same as seen in Exhibit 1—the speed with which violations of the allocation bounds were addressed made little difference to the amount of time the real estate allocation spent out of range. For the overall portfolio, the quarterly volatility and the average annual returns were slightly lower than in the previous exhibits because of the higher allocation to real estate, but the numbers were virtually unchanged across different rebalancing speeds. The general conclusions appear to hold for investors with either higher or lower real estate allocations.

Conclusions

I must again emphasize that these are very simplified examples, do not represent any actual real-world

portfolio, are based only on core real estate, and assume investors followed simple, mechanical rebalancing rules for their real estate allocations. Nevertheless, the general conclusions may be useful to investors when they face the denominator effect on their real estate allocations, as they surely will again at some point in the future. Based on the results of the simple analysis, the speed with which investors move to correct over-allocations to real estate makes little difference to the portfolio. Rebalancing to a strategic asset allocation target is an important part of portfolio management, but real estate investors may be better off taking the time to do so in a well-thought-out and orderly way rather than worrying about correcting imbalances as quickly as possible. ■

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