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Re-Examining the Real Estate Quadrants

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ABSTRACT

The real estate quadrant approach for categorising the real estate investment universe was first formulated by Hudson-Wilson (2001) and is now 20-years old. These investment conduits have developed significantly over this time and real estate allocations are being shaped by both market and regulatory forces, which are leading investors to re-examine the broadening of blended strategies across these quadrants. In this paper, we examine their performance and dynamic inter-relationships and how these have evolved over time, as well as how they can be utilised to enhance risk adjusted returns. The results show that significant diversification benefits are available to investor utilizing the quadrants. The CMBS market is found to be the main transmitter of shocks amongst the quadrants and private real estate the most significant receiver, with a meaningful shift in their relationships before and after the Global Financial Crisis. Finally, blended real estate portfolios are found to lower the estimated risk and enhance the risk-adjusted performance of a purely private real estate exposure.

KEY TAKEAWAYS

1. Significant diversification benefits are available to investor utilizing all forms of real estate exposure, given our findings that only ~30% of the system is influenced by one another in isolation.
2. Blended real estate portfolios lower the estimated risk and enhance the risk-adjusted performance of a purely private real estate exposure.
3. Using static and dynamic connectedness methodology we found that Public Debt is the main transmitter and Private Equity the most significant receiver of shocks amongst the real estate quadrants.

Key words: Asset management, Dynamic Connectedness, Spillovers, Real Estate Quadrants, Asset Allocation,

JEL Codes: G11, G12,

INTRODUCTION

Institutional investors have four primary investment conduits through which they can gain exposure to commercial real estate, these being Public and Private holding structures, across Debt and Equity investments. These four investment options are often referred to as the 'quadrants' and can be accessed through a range of holding structures including direct ownership and management or indirect exposure through funds (limited partnerships etc.) and other investment vehicles. Investors are often invested in more than one of these quadrants whether this be in discrete real estate programs or when considering their portfolios in a multi-asset context For example REITs may form a component of an investor's dedicated real estate allocation or be accessed through their public markets investments if this isn't the case. However, evolving institutional real estate investment strategies driven by both market and regulatory forces, are leading real estate investors to re-examine the broadening of blended strategies with active allocations across multiple quadrants.

Much of the asset allocation work in relation to institutional commercial real estate is centred on the assumption that it is either a private market equity allocation or for investors with a greater liquidity focus, an allocation to REITs. There is much less available research covering the performance and risk implications of blended real estate portfolios composed. Increasingly, however, we see portfolios that need both the diversification benefits of private markets and the potential for liquidity of listed markets. Defined contribution ("DC") pension plans in the US are a good illustration of this as they have a requirement to provide liquidity on a daily or monthly basis. This creates a need for DC real estate portfolios to include at least a small degree of listed market exposure.

The purpose of this paper is to try and answer the following questions:

1. **Why now?** Do recent market circumstances warrant a re-examination of the use of the quadrant framework for allocations decisions?
2. **What have we learned** about the relationships between the quadrants? Does correlation tell us enough or is there a more nuanced assessment of the complex relationships between quadrants over time that should be considered? How interdependent are the quadrants? Can we understand not just the similarity of the return profiles but the direction and causality? For this we use the dynamic connectedness methodology to determine which quadrants are "transmitters" and which are "receivers" amongst one another.
3. **What are the risk-return implications of quadrants blends to implement the real estate allocation?** Using practical allocations and risk-return frameworks, what can we understand about the risk-return features of blended real estate portfolio strategies? For this we utilize what we consider to be a more appropriate framework for the evaluation of real estate performance, namely the Conditional Value at Risk ("CVaR") risk measure of Boudt et al (2008) and risk budgeting framework of Boudt et al (2012)

THE QUADRANTS

Market development over the past 20-years

The quadrant investment model was first illustrated by Hudson-Wilson (2001) and developed in subsequent papers (Hudson-Wilson et al 2003 & 2005). It is worth noting that in the original paper the idea was that the universe should be expanded from the traditional realms of private equity and private debt to include the "new" public equity and public debt market exposures. Clearly, the real estate quadrant universe has developed considerably over the past 20-years and has become increasingly accessible for investors seeking exposure to the asset class. The development and performance of the quadrants during the recent market cycle warrants a re-examination of their risk and return characteristics.

The current estimated size of the Quadrants for the US are shown in Table 1.

Table 1: Estimated US Commercial Real Estate Quadrant Market Sizes as at June 2020

	PUBLIC	PRIVATE
DEBT	Fannie/Freddie, CMBS, CMO, Mortgage REITs, REIT Corp Bonds *Size: US$1,376 bn*	Senior/Whole Loans *Size: US$2,541bn*
EQUITY	REITs *Size: US$697bn*	Directly held assets, LPs, LLCs *Size: US$836bn*

Source: Pension Real Estate Association, August 2020

Over the last 20-years the relative size of the component quadrants for the US has changed as follows: (2001 figures in brackets). Private debt remains the largest at 47% (46%), Public Debt at 25% (12%) has shown the most significant relative growth, Private Equity has declined to 15% (33%) and Public Equity has risen to 13% (9%). Overall private markets remain the most significant at 62% versus 38% for public markets. This compares to the 79%:21% split back in 2001.

Factors driving the re-examination blended real estate portfolios

We believe that there are several factors which are driving a move to re-examine the use of the quadrants model in real estate allocation. These include the ongoing repositioning of liquidity preferences amongst investors, with an increased desire by some to improve liquidity (by adding a public market exposure), whilst others have sought to reduce volatility and improve risk adjusted returns by allocating capital away from public markets to private markets.

The new regulatory frameworks instituted post the Global Financial Crisis ("GFC") are playing a significant role in determining allocations among the quadrants for investors. These include, but are not limited to, the growth of DC pension schemes that are required to provide daily pricing and the introduction of capital provisioning requirements such as Solvency II. For example, Duca and Ling (2020) showed that the Dodd Frank Act which the capital requirements for CMBS significantly impacted pricing in the direct real estate market.

The recent pricing vacuum caused by low transaction levels has led to an apparent disconnect between public and private equity markets. The potential value arbitrage across the quadrants is an opportunity that can be capitalized upon by certain real estate programs, as it was in the post-GFC environment. For example, certain private real estate managers, most notably those of Opportunistic funds, take stakes in listed vehicles in most regions which have a significant public equity market. It is noted that there is a greater involvement where there is a REIT structure in place and a high degree of sub-sector asset specialisation. The broadening of investment remits, particularly for higher risk-return private real estate fund programs, is creating further exposure to public equity and debt investments within the asset class which need to be better understood.

Finally, on the demand side, the caution of senior lenders coupled with continued appetite for the sector has led to a gap between the supply of senior debt LTVs available and the demand from asset owners. As a result, new players are entering into the Whole loan and Mezzanine finance market to enhance senior LTVs to levels which would provide acceptable returns and minimise the equity capital deployed.

Prior research

To date the Hudson Wilson papers (2001, 2003, and 2005) are the only published studies analysing the risk return implications of blending all quadrant exposures. Private market performance was represented smoothed private market performance and the quadrant exposure used was weighted according to market size estimates. Mean-variance analysis showed that this exposure provided attractive diversification benefits to a stock-bond portfolio with high optimal blended real estate allocations recommended for lower risk portfolios. The historically high risk-adjusted total returns and income return components were also cited as attractive characteristics for investors.

A handful of studies have assessed blended real estate portfolios across private and listed equity exposures. These generally concluded that the inclusion of a listed allocation contributed positively to overall risk-adjusted returns and was not detrimental to broader portfolio diversification. Stevenson (2001) demonstrated that the inclusion of domestic and international public real estate securities allocations diversified direct U.S. real estate portfolios. However, the results were largely contingent upon whether the direct portfolio was itself well diversified.

Esrig, Kolasa, and Cerreta (2013) examined a US defined contribution pension (“DC”) investor’s portfolio for diversification benefits arising from incorporating allocations to private real estate and REITs. The authors showed that a 10% allocation to the blended real estate solution substantially improved risk-adjusted returns and the maximum drawdown measure. Moss and Farrelly (2014) used a sample of UK unlisted and global listed to assess the performance and risk implications of blending these exposures in-line with prevailing UK DC real estate product allocations. The authors found that overall performance materially increased and there was a relatively limited impact upon risk-adjusted performance. They refined their measurements for risk by accounting for non-normalities and valuation smoothing and found that unlisted funds contributed to a greater share of overall risk. Indeed, it was shown that this

adjustment led to unlisted real estate making a risk contribution that was meaningfully closer to its equity allocation.

QUADRANT PERFORMANCE

The following total returns indices have been used to measure the performance of US real estate quadrants:

Private Equity .US private commercial real estate equity is represented by the NCREIF Transaction Based Index ("TBI"). This measures the direct (unleveraged) performance of institutionally held US commercial real estate assets. The TBI has been selected to circumvent valuation smoothing issues and is calculated using the observed performance of direct commercial real estate assets, which are bought and sold in a given quarterly period. The use if this index negates the need to select a statistical unsmoothing approach for the purposes of this study and the methodology used for its construction is detailed in Fisher et al (2007).

Public real estate equity is measured by the FTSE-NAREIT US All Equity REITs Index ("FT-REIT").

Private Debt. To measure the performance of US real estate debt the Giliberto-Levy Commercial Mortgage Performance Index ("G-Levy") is used to measure private real estate debt market return and this represents the performance of institutional-grade commercial mortgage senior and whole loans.

Public Debt .Public market real estate debt performance is represented by the Bloomberg Barclays Investment Grade US CMBS Index ("Barc-CMBS") which is comprised of investment-grade commercial mortgage-backed securities. Interestingly this was the only series found to exhibit any serial correlation issues and for the purposes of this study it has been unsmoothed using a simple AR(1) regression model coefficient. For this index the one-period lagged regression coefficient used to unsmooth the series was 0.33 and it should be noted that all data and analysis is based on the estimated unsmoothed series.

All analysis undertaken in this study used quarterly total returns from the first quarter of 1997, when the CMBS index commenced, up to the end of the first quarter of 2020. This was when final data was available for the four total returns series used.

Summary statistics for these performance indices are provided in Table **2**. As can be seen the total returns generally have a low positive correlation with one another suggesting that whilst they all provide access to the US commercial real estate market, they do so with specific performance patterns with consequential diversification benefits. The main exception to this is the relationship between the debt exposures which show a high degree of positive correlation and have delivered comparable levels of total returns to investors over the sample period. REITs have historically delivered the highest level of volatility; however, these vehicles utilize financial leverage and are also exposed to equity market price movements.

Table 2: Quarterly Total Returns Summary Statistics				
Statistic	**NCREIF Transaction Based Index**	**FTSE NAREIT All Equity REIT Index**	**Giliberto-Levy Commercial Mortgage Performance Index**	**Bloomberg Barclays Investment Grade US CMBS Index**
Mean	0.023	0.026	0.016	0.015
Median	0.020	0.027	0.016	0.015
Minimum	-0.172	-0.388	-0.076	-0.194
Maximum	0.178	0.333	0.085	0.187
Volatility	0.047	0.102	0.020	0.047
Skewness	-0.282	-0.873***	-0.349	-0.292
Kurtosis	3.692***	3.845***	4.531***	4.939***
Jacque Bera	53.465***	68.374***	80.586***	94.815***
Observations	92	92	92	92
Correlation Matrix				
NCREIF TBI	1.000			
FTSE Eq REIT	0.003	1.000		
Gil Levy	0.073	0.293	1.000	
Barc CMBS	-0.117	0.464	0.693	1.000

*Note: ** indicates significance at the 1% level, ** indicates significance at the 5% level, * indicates significance at the 10% level*

METHODOLOGY

This study aims to provide a richer understanding of the performance dynamics and diversification benefits available to investors through the real estate quadrants. The Global Financial Crisis ("GFC") period brought into stark contrast that relationships between assets classes can vary significantly through market cycles. To provide further insight on the degree of interconnections between the quadrants over time we utilize the dynamic connectedness methodology originally developed by Diebold and Yilmaz (2102, 2014). This flexible approach provides several connectedness and spill over measures over time based on the estimated forecast error variance decompositions from rolling windows of vector auto regressions. It enables the assessments of the temporal interdependence across a set of variables and measures the influence of variables both upon themselves and amongst each other.

Given that there are 92 quarterly periods in the sample and the Diebold and Yilmaz (2014) method relies upon estimation of rolling vector auto regressions, its use would result in a significant loss of sample size. To avoid this, we use the Antonakakis et al (2020) methodology based on a time-varying parameter vector autoregression for the entire dataset with no loss of observations. In addition to the benefit of not losing observations this approach also negates the need to arbitrarily set the rolling estimation windows and it is less sensitive to outliers. Given the pronounced impact of the GFC period upon real estate performance, this was also a consideration. Dynamic connectedness estimates are all based upon an eight-quarter ahead forecast error variance decompositions and a quarterly vector autoregression of three lags which was determined using the Akaike Information Criterion. It is worth noting that that the dynamic connectedness estimates and analysis provided were insensitive to adjustments in either the forecast period or lag structures selected.

When assessing blended real estate portfolio risk, most published and commercial research relating to real estate in an asset allocation context continues to have a focus on volatility as the central measure of risk. The Jacque Bera statistics in Table 1 show that the sample time series do not have a normal distribution and given non-normality volatility is not a risk measure ideally suited for the data. Indeed, the academic literature pertaining to this consideration has also found non-normality e.g. Graff and Young (1995), Graff et al (1997), Devaney et al (2006), and Young (2008). One of the aims of this study is to analyse portfolio risk using a measure that better accounts for the non-normal characteristics of real estate performance data.

We believe that institutional investors should be more focussed on this aspect of risk from a practical basis. This is especially true for long-term investors who are able accept the relative illiquidity of private asset classes and thus are more likely be exposed to extreme downside outcomes than investors with shorter-term hold periods. To do this we use Conditional Value at Risk ("CVaR") which measures downside-risk and can capture the non-normal characteristics of the data. To provide clarity on the risk allocations to various exposures, we utilize the CVaR risk budgeting framework of Boudt et al (2012). Portfolio risk budgeting involves attributing the contribution to total portfolio risk of each component asset class or investment position. CVaR is calculated using the modified CVaR estimator from Boudt et al (2008), which is found to better account for portfolios with non-normal performance characteristics, as is the case of this study's sample.

RESULTS

Static connectedness

Table 3 presents the static connectedness results that represent the average estimates for the full sample period .We believe these provide a far more nuanced and detailed understanding of the relationship than simple correlation analysis.

Table 3: Spillover Indices Results (%)

	NCREIF Transaction Based Index	FTSE NAREIT All Equity REIT Index	Giliberto-Levy Commercial Mortgage Performance Index	Bloomberg Barclays Investment Grade US CMBS Index	Contribution From Others
NCREIF TBI	85.87	5.96	2.09	6.07	14.13
FTSE Eq REIT	1.74	75.36	4.49	18.41	24.64
Gil Levy	2.52	3.87	61.53	32.07	38.47
Barc CMBS	2.15	12.58	29.09	56.19	43.81
Contribution To Others	6.41	22.42	35.66	56.55	**Total Connectedness**
Net Spillovers	-7.72	-2.22	-2.80	12.74	**30.26**

Total connectedness is estimated to be 30.2% which shows that the interrelationships between the quadrants account for marginally less than a third of the total forecast error variance of the system. This relatively low figure implies significant diversification benefits are available to investors which is consistent with the trend and correlation metrics discussed

previously. The diagonal figures within the matrix capture intra-asset class connectedness of shocks over time and the other matrix figures highlight the inter asset class connectedness of shocks. These results highlight that within asset class shocks have by far the greatest impact within the system. For example, innovations in TBI performance explains 85.9% of its own forecast error variance.

The largest pairwise directional connectedness is from Barc-CMBS to G-Levy performance (G-Levy to Barc-CMBS) at 32.1% (29.1%). When considering the impact of the GFC period upon US real estate credit markets over the sample period this result seems plausible and suggests a high degree of alignment across US real estate debt capital markets. The next most significant pairwise connectedness relationship is between the public asset classes with Barc-CMBS to FT-REIs at 18.4%. The "Contribution from Others" column total shows the share of shocks received from the other assets in the total variance of the forecast error for each individual asset class. In similar vein, the "Contribution to Others" row total details the aggregate shocks from a specific asset class to the others. The "Net Spillovers" estimate is calculated by deducting these two totals. The dominant asset class and only net transmitter of shocks within the system has been the Barc-CMBS market. Private real estate performance has been the largest receiver of shocks within the system and least impactful across all connectedness measures.

Dynamic connectedness

Whilst these static connectedness measures are revealing, a richer set of evolving relationships over time can be seen in the time-varying estimates of dynamic total connectedness. This is shown in Figures 1 and 2, with Figure 1 attributing this to the contribution of shocks to the other assets classes and conversely Figure 2 show the contributions of shocks from each quadrant.

Figure 1: Total Connectedness Attributed to Spillovers to Quadrant Total Returns

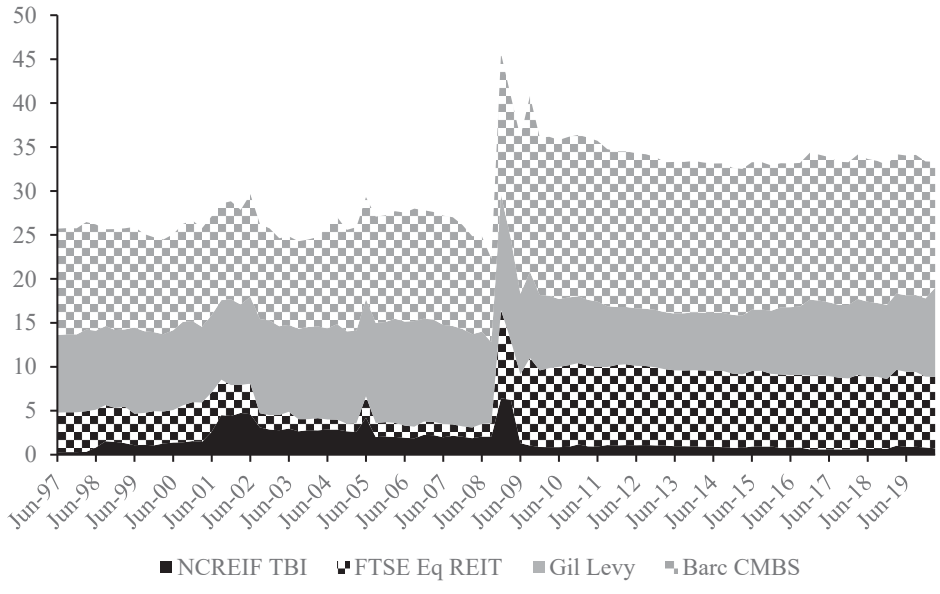
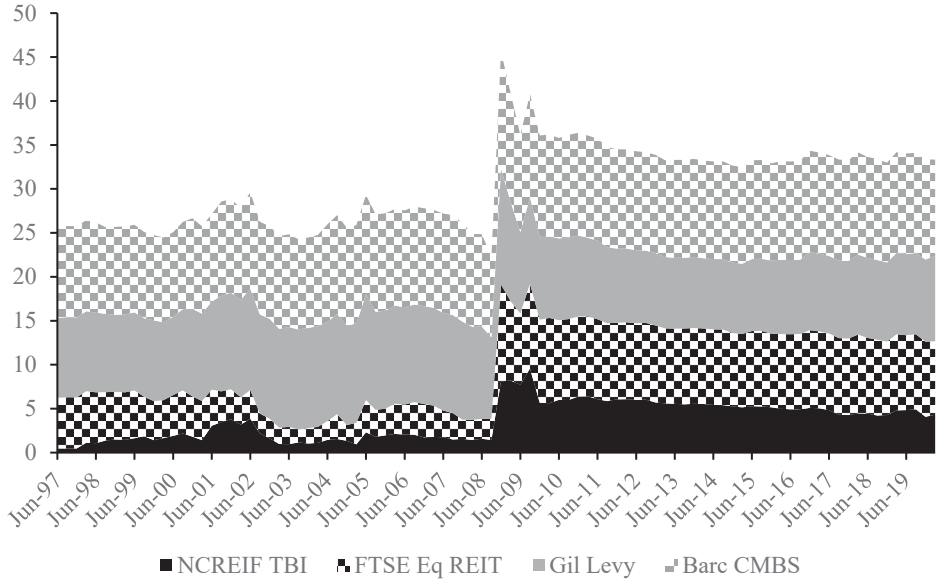


Figure 2: Total Connectedness Attributed to Spillovers from Quadrant Total Returns



The estimated total dynamic connectedness shifted materially in the pre and post GFC period. The highest levels of connectivity naturally occurred during the 12-month period from end June 2008 to June 2009. Post the GFC there has also been a marked increase in the level of connectedness between the quadrants. This shows that interdependencies between the quadrants is elevated during downturns and is shaped by market circumstances. For example the higher levels of connectivity in the post-GFC period could have been influenced by the new regulatory environment impacting real estate lending activity, as found by Duca and Ling (2020), and/or the historically interest rates that have prevailed during this time.

Figure 4: Quadrant Total Returns Dynamic Net Spillovers

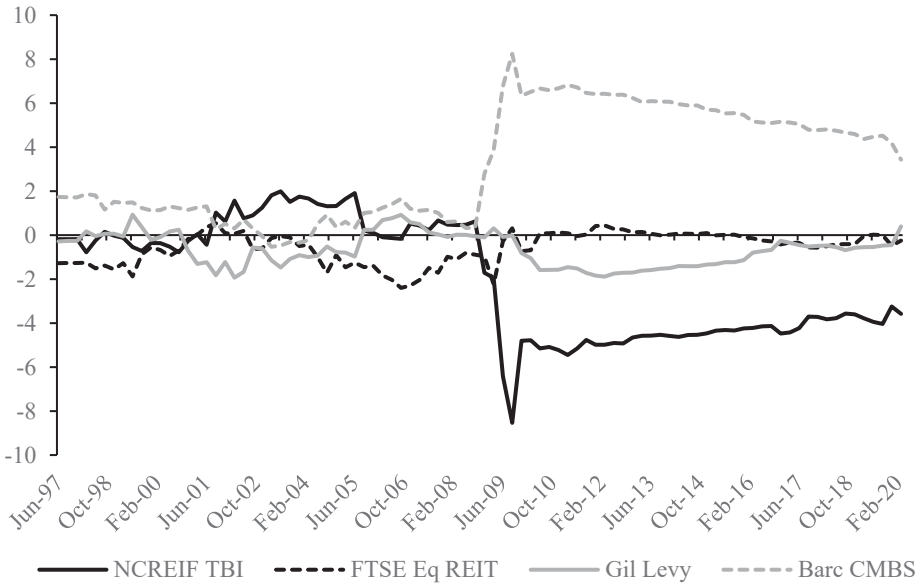


Figure 1 highlights that the listed asset classes have become the more influential transmitters in the post GFC phase. This is particularly true for FT-REITs and G-Levy was less influential in this regard. Whilst the TBI remains the least affected asset class by shocks from other quadrants, Figure 2 shows that it is ow more impacted post-GFC and FT-REITs are much more influenced within the quadrant network. These dynamics are highlighted more clearly in Figure 4 which show the net spillovers through time. The impact of the GFC shows a start step-up in the influence of the BARC-CMBS market as a major source of variability and as a net transmitter of shocks. Conversely the TBI was a net receiver. Whilst the static connectedness analysis also provided these conclusions, it masked significant temporal evolutions in the relationships.

Blended real estate portfolio risk and return

Turning to the portfolio construction and diversification considerations of blended real estate portfolios for investors, Table 3 details the risk-return and estimated risk attribution for several blended real estate portfolio strategies and these are contrasted with the performance of the TBI.

Table 4: Blended Real Estate Portfolio Risk-Return Characteristics

	Equity		Debt			
	Private	Public	Private	Public		
	Portfolio Allocation %				Ann. Mean Total Return	
Private Real Estate Equity	100.0				9.2	
Mean-Variance Optimized - Quadrant	18.0	0.0	82.0	0.0	6.8	
Equal Weight - Equity	50.0	50.0	-	-	9.8	
Equal Weight - Quadrant	25.0	25.0	25.0	25.0	8.0	
Equal Weight - Private Markets	50.0	-	50.0	-	7.8	
DC - Equity	85.0	15.0	-	-	9.4	
DC - Quadrant	42.5	7.5	42.5	7.5	7.8	
Equal CVaR - Equity	82.1	17.9	0.0	0.0	9.5	
Equal CVaR - Quadrant	54.8	5.8	27.2	11.2	8.0	
	Volatility Attribution %				Ann. Volatility %	Sharpe Ratio
Private Real Estate Equity					9.4	0.76
Mean-Variance Optimized - Quadrant	22.0	0.0	78.0	0.0	3.9	1.23
Equal Weight - Equity	17.5	82.5	-	-	11.2	0.69
Equal Weight - Quadrant	9.3	60.7	8.0	22.0	7.4	0.80
Equal Weight - Private Markets	82.5	-	17.5	-	5.3	1.09
DC - Equity	87.1	12.9	-	-	8.6	0.86
DC - Quadrant	61.2	13.8	19.4	5.7	5.1	1.12
Equal CVaR - Equity	81.6	18.4	-	-	8.5	0.87
Equal CVaR - Quadrant	78.9	7.1	8.5	5.6	5.8	1.04
	CVaR Attribution %				95% CVaR %	C-Sharpe Ratio
Private Real Estate Equity	100.0	-	-	-	10.5	0.68
Mean-Variance Optimized - Quadrant	29.9	0.0	70.1	0.0	5.3	0.89
Equal Weight - Equity	22.2	77.8	-	-	18.8	0.41
Equal Weight - Quadrant	17.7	44.6	10.8	26.9	15.2	0.39
Equal Weight - Private Markets	70.2	-	29.8	-	6.3	0.90
DC - Equity	66.5	33.5	-	-	9.4	0.79
DC - Quadrant	14.8	33.8	34.6	16.8	9.1	0.63
Equal CVaR - Equity	50.0	50.0	-	-	9.9	0.75
Equal CVaR - Quadrant	25.0	25.0	25.0	25.0	8.3	0.72

Notes: The C-Sharpe Ratio was calculated by dividing average porfolio returns less the risk-free rate over the estimated CVaR. For both the Sharpe and C-Sharpe ratios the assumed risk free rate was the average 3-month Tbill rate over the sample period of 2.1%.

We note that the mean variance optimized outcome did not allocate to public markets and allocated 82% of exposure to G-Levy. This allocation is impractical given its unlikely to provide the long-term returns required by many real estate investors and that many also require elements of liquidity within their portfolios. Instead this study is focussed on several pre-

specified blended real estate portfolio strategies including equal weighted, defined contribution ("DC") with 85% private and 15% public allocations, and equal risk concentration portfolios.

It can be seen that blended real estate portfolios lower the estimated risk and enhance the risk-adjusted performance of a purely private real estate exposure when considering risk in-terms of volatility, although it should be noted that broader multi-asset considerations are not being addressed in this study. The use of the CVaR risk measure leads to differing risk-adjusted outcomes and conclusions, with not all blended portfolios outperforming private equity on a risk-adjusted basis. The blended quadrant portfolio allocations provide meaningful improvements to the Sharpe-Ratio relative to their equity equivalents and a private equity only exposure. Conversely, the C-Sharpe ratios marginally worsen. Similarly, the inclusion of a debt exposure in the strategies leads to moderately reduced C-Sharpe ratio outcomes. This can be attributed to the negative performance seen during the GFC period that the CVaR measure captures more fully.

For DC investors, the inclusion of a liquid exposure does not materially impair risk and return. For example, the DC-Equity portfolio provides enhanced absolute and risk-adjusted returns irrespective of the risk measure considered. For this portfolio strategy the listed exposures make a greater contribution to risk in the case of the CVaR measure. The equally weighted private markets portfolio provides the highest C-Sharpe ratio. The equal risk (CVar) weighted portfolios both provided prominent exposure for the TBI but in both instances, equity-only and quadrant allocations, risk-adjusted was enhanced relative to the TBI. In the case of the equity-only minimum risk concentration portfolio, higher absolute returns were also generated.

CONCLUSIONS

This purpose of this paper was to answer the following questions:

1 Why now?

We believe that there are both market and regulatory reasons to believe that the Quadrant model can be usefully used as a framework for allocation decisions. The market of all four quadrants is sufficiently liquid, and there is evidence of market practitioners adopting new investment strategies which encompass additional quadrants in addition to their existing expertise.

2 What have we learned about the relationships between the quadrants over the last 20 years?

The use of the dynamic connectedness methodology of Antonakakis et al (2020) has uncovered a richer set of dynamic relationships dynamics across the real estate quadrant asset classes.

- Significant diversification benefits are available to investor utilizing all forms of real exposure given only ~30% of the system is influenced by one another in isolation.
- Credit markets are highly interconnected, public variables next and Private Equity least impactful although it is the most impacted.
- Dynamically there are significant pre and post GFC sets of relationships. They are more connected post GFC which suggests less diversification benefits during this period.
- Public assets classes are more impactful post the GFC.

- Public Debt is the main transmitter and Private Equity the most significant receiver of shocks

3 What are the risk-return implications of quadrants blends to implement the real estate allocation?

The portfolio risk-return analysis presented in this study suggests that investors should be mindful of the non-normality issues associated with commercial real estate asset class performance when forming their asset allocation decisions. It is recommended that investors do not extensively focus on mean-variance based analysis. Given the non-normal performance characteristics shown, asset allocation and risk-frameworks should address the 'left-tail' downside risks resulting from events such as the GFC. This particularly true for longer-term institutional investors in illiquid asset classes who are more likely to be exposed to extreme downside outcomes.

This study also demonstrates that investors should consider the contribution to risk from various asset classes and not be entirely focussed on capital allocations. For a range of blended real estate portfolio strategies tailored to investor preferences, the risk contributions differ markedly to their capital allocations.

The methodologies and frameworks employed in this study have wider application for broader real investment and portfolio construction considerations. It is well noted that the TBI measures the performance of a Core strategy and this could be augmented by more granular real estate portfolio strategies which encompass a broader range of private real estate equity allocations such as Value Add and Opportunistic funds. The relative merits of blended real estate portfolios in a multi-asset context should also be explored further alongside similar quadrants allocations for other 'alternative' asset classes such as infrastructure and corporate lending. Blended the risk-return implications of private and public allocations should also be further analysed in the context of DC programs which have greater liquidity needs than other institutional investment programs.

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