Yes, Stocks, Bonds, and Real Estate Are Exposed to Different Risk Factors

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Diversification of the overall portfolio is the most important reason institutional investors give for allocating to commercial real estate (PREA 2018 Investment Intentions Survey). The key metric of diversification is, of course, correlation. Measuring correlation between private market assets such as real estate and publicly traded asset classes is difficult because of the different market mechanisms. In private real estate, popular indices such as the NCREIF Property Index (NPI) are based on appraised values rather than traded prices and tend to underestimate both volatility and correlations with other asset classes. The correlations in Exhibit 1 are based on returns to the NCREIF Transaction Based Index (NTBI), an index based on the same universe of properties as the NPI but that uses transaction prices of properties that sell during a quarter to adjust appraised values.[1] The NTBI therefore avoids the appraisal smoothing common to private real estate indices and provides a better comparison to publicly traded assets.

The diversification benefits of real estate as an asset class are clear from the exhibit, with real estate having a correlation with equities close to zero and a slightly negative correlation with the total returns to bonds. In fact, the correlation of real estate with bonds is lower than that of equities with bonds, indicating that, despite

Exhibit 1: Correlations (Quarterly Total Returns, 2Q1984 to 2Q2018)

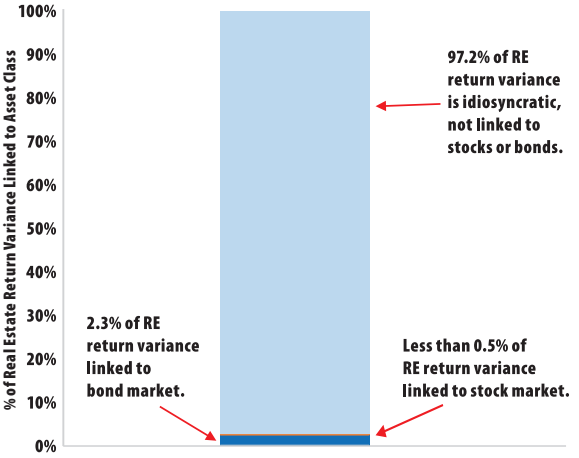
	Bonds	Stocks
Real Estate	-0.15	0.07
Stocks	-0.01	

Source: PREA Research based on data from NCREIF, Thomson Reuters Datastream
Note: Real estate is represented by the NCREIF Transaction Based Index, stocks by S&P 500, and bonds by the Barclays US Aggregate Bond Index.

often being described as having some bond-like characteristics, real estate is a better diversifier of bonds than is an equity allocation.

But while correlation is the key measure of diversification potential, it is a high-level metric. Is it possible to get a more-detailed picture of the relationship between these asset classes that would be useful to investors in forming portfolios?

Exhibit 2: Breaking Down Investment Risk in the Real Estate Market—How Much Is Related to the Stock and Bond Markets?



Source: PREA Research based on data from NCREIF, Thomson Reuters DataStream
Note: Real estate represented by the NCREIF TBI, stocks by the S&P 500, and bonds by the Barclays US Aggregate Bond Index.

Decomposing the Variation of Real Estate Returns

A standard measure of risk in traditional portfolio theory is the variation in returns over time. All three asset classes considered here, stocks, bonds, and real estate, have returns that vary over time; some quarters have great returns, some are not so great, and some quarters are downright bad. Some of the variation in returns over time may be based on factors common to the three asset classes—perhaps sometimes the same factors that lead to good (or bad) returns for stocks also affect the real estate market and lead to good (or bad) returns there as well. Exhibit 2 provides estimates of the percentage of real estate return variation that can be linked to returns to the stock and bond markets. Another way of thinking of this is that the exhibit estimates the percentage of

1. For a fuller discussion of the NTBI, see the PREA Research report "A Primer on Commercial Real Estate Indices," available to members on the PREA website.

real estate risk (measured by how variable returns are) that is driven by the same factors that underlie stock and bond risk.[2]

How much of the real estate market is driven by the stock and bond markets? Not much. Using quarterly returns from 2Q1984 to 2Q2018, Exhibit 2 shows that only 2.3% of the variation of real estate returns is associated with the variation in bond market returns, and only a minuscule slice (less than half a percent) is associated with the variation in the stock market. The vast majority of real estate risk is idiosyncratic. That is, returns to the real estate market march to their own drummer, and only a tiny amount is linked to what is happening to returns on the bond and stock markets. This is ideal for an effective diversifier within an overall portfolio.

Do Different Risk Factors Drive the Different Markets?

A popular approach to portfolio formation strategy is based on factor investing. The central idea is that the returns of many asset classes are driven by several macro-level risk factors, perhaps GDP growth, interest rates, inflation, or other variables. Factor investing involves estimating the exposure of different asset classes to each factor, deciding to which factors to be exposed (i.e., from which factors to earn a risk premium), and forming a portfolio accordingly. Even if an investor is not using a factor investing approach explicitly, understanding the macro-level risk factors underlying investments can be extremely enlightening, as it essentially means understanding the source(s) of risk. Every investment can be thought of as a bet, and understanding what drives the returns of an asset class means understanding what the investor is betting on.

The relevant question here is whether the risk factors underlying real estate are different from those underlying stocks and bonds. We already know that the link between the returns to real estate and the other asset classes is very weak—but is that because real estate is less exposed to the same factors or because real estate is driven by different economic factors than are stocks and bonds?

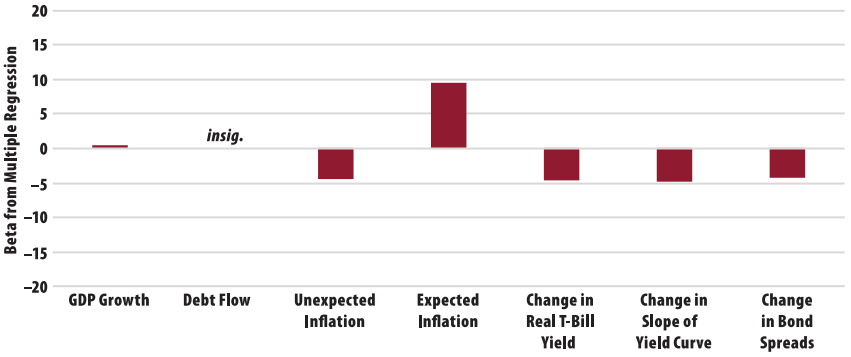
To examine this question, I conducted some simple tests looking at the exposure of the three asset classes to various macro risk factors. In particular, I examined the exposures of stocks, bonds, and real estate returns to GDP growth, inflation (both expected and unexpected), changes in (real) short-term interest rates, changes in the slope of the yield curve, changes in the spread on corporate bonds (i.e., bond risk premia), and a measure of the flow of debt in the economy. Details on each factor and the sources of data are provided in Exhibit 3. It is important to note that I am not trying to find the "best" model of real estate returns or trying to find all factors that drive returns to property investments. Rather, I am simply interested in looking at a short list

Exhibit 3: Risk Factors Examined

GDP Growth	Measured in real terms (annualized). Source: Bureau of Economic Analysis
Debt Flow in Economy	Measured as private-sector total borrowing during the quarter as a percentage of GDP. Total borrowing was calculated from US Flow of Funds data as borrowing by domestic non-financial sector plus borrowing by domestic financial sector minus borrowing by state, local, and federal governments. Sources: Federal Reserve Board Flow of Funds, Bureau of Economic Analysis (for GDP)
Inflation	Expected Inflation: An autoregressive regression on annualized CPI inflation is estimated (i.e., regressing inflation on lagged inflation). The predicted value of the regression is expected inflation. Unexpected Inflation: The residuals from the regression serve as unexpected inflation. Source: PREA Research based on Bureau of Labor Statistics data
Change in Real T-Bill Yield	Based on yield on three-month Treasury bills. CPI inflation was subtracted to obtain real yield. The change in real yield from the previous quarter was used as the factor. Sources: PREA Research, Federal Reserve, Bureau of Labor Statistics
Change in Slope of Yield Curve	Slope of yield curve measured as the yield on ten-year Treasuries minus the yield on three-month Treasury bills. The factor is the change in this spread from the previous quarter. Source: Federal Reserve
Change in Bond Spreads	Bond spread (i.e., default, or risk, premium) was measured as the yield on Barclays US Aggregate Bond Index minus the yield on ten-year Treasuries. The factor is the change in this spread from the previous quarter. Sources: Federal Reserve Board, Thomson Reuters Datastream

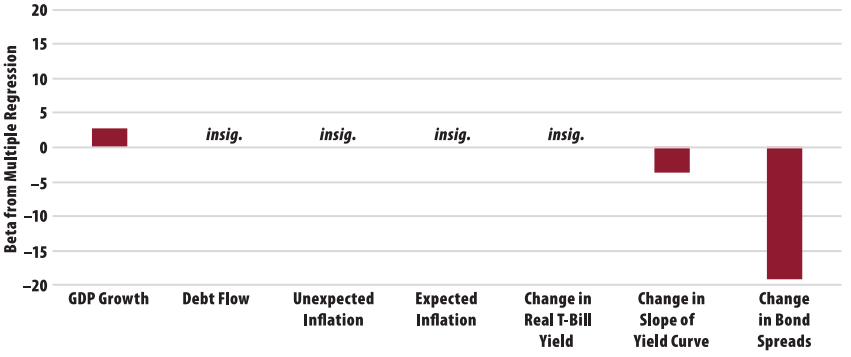
2. For those interested in the details of the methodology used here to analyze private market real estate, please see "The Relative Importance of Stock, Bond and Real Estate Factors in Explaining REIT Returns," Jim Clayton and Greg MacKinnon, 2003, *Journal of Real Estate Finance and Economics*, Vol. 27, No. 1.

Exhibit 4: Bonds' Exposure to Risk Factors



Source: PREA Research based on data from Barclays, Bureau of Economic Analysis, Federal Reserve Board, Bureau of Labor Statistics, Thomson Reuters DataStream
Note: "Insig." indicates that a statistical test shows the number is small enough that it cannot be reliably determined to be different from zero.

Exhibit 5: Stocks' Exposure to Risk Factors



Source: PREA Research based on data from Barclays, Bureau of Economic Analysis, Federal Reserve Board, Bureau of Labor Statistics, Thomson Reuters DataStream
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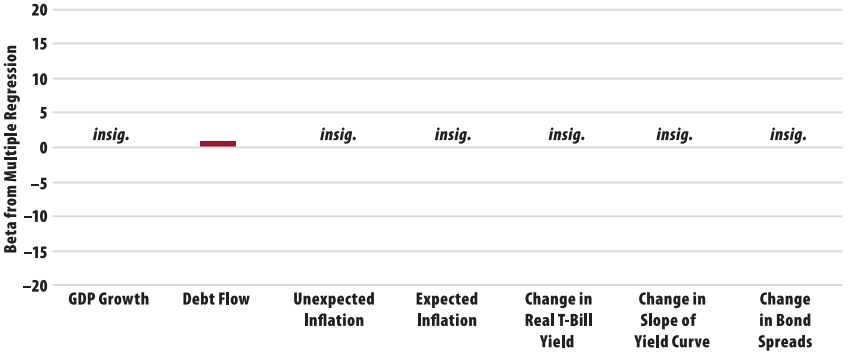
Exhibit 6: Real Estate's Exposure to Risk Factors



Source: PREA Research based on data from Barclays, Bureau of Economic Analysis, Federal Reserve Board, Bureau of Labor Statistics, Thomson Reuters DataStream
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of macro risk factors and seeing if real estate is exposed to different factors than are the other asset classes. Is an allocation to real estate a bet on different things than is an allocation to stocks or bonds?

Exhibit 4 shows the risk exposures of bonds. Unsurprisingly, bonds have a negative exposure to the interest rate variables; bond returns are lower when short-term rates rise, the yield curve steepens, or spreads increase. As theory would predict, if inflation is higher but is expected by the market and can therefore be incorporated into yields in advance, then bond returns are higher, but bond returns suffer when inflation is high unexpectedly. Bonds also have a slight exposure to overall economic growth, having higher returns when the economy is performing better. Despite being debt, bond returns have no significant relationship to the flow and availability of debt in the economy.

Exhibit 5 shows that the risk exposures of a stock allocation are somewhat different from those of bonds. Stock returns are especially sensitive to increases in risk premia (as measured by the bond market spread) and also suffer when the yield curve steepens. Stocks do not seem to be exposed to risk from inflation, short-term interest rates, or debt flow in the economy but are more sensitive than bonds to economic growth. Hence, while sharing some similarities, bonds and stocks each represent a distinct bundle of "bets" on underlying risk factors.

However, the differences between stocks and bonds pale in comparison to the differences between real estate and the other two asset classes. Returns to a broad portfolio of (mostly core) US real estate as represented by the NTBI are not exposed to any of the same risk factors as stocks and bonds (Exhibit 6). In fact, from the list of variables examined, the only risk factor with a signif-

icant influence on real estate returns is the one to which neither stocks nor bonds had any exposure: the availability of debt in the economy. Real estate returns have a positive relationship to debt flow—the greater the flow of debt in the economy and therefore its greater general availability, the higher real estate returns tend to be. For those interested in current market conditions, in which many investors express fear about what effect rising interest rates might have on property returns, this is a particularly important result because it indicates that the cost of debt is not what matters for real estate but the availability of debt—as long as debt capital continues to flow, then rising interest rates should not adversely affect real estate returns.[3]

3. A similar result was found using a different approach and reported in a previous article. See "Rising Interest Rates and Real Estate: It's the Economy That Matters," Greg MacKinnon, *PREA Quarterly*, Winter 2014.

Most important for diversification purposes, the risk exposures shown in Exhibits 4, 5, and 6 indicate that the real estate's factor exposure is essentially the opposite of that of the other two asset classes—real estate is not exposed to the factors influencing stocks and bonds but is exposed to a factor that does not influence stocks and bonds. On a macro level, an allocation to real estate is a bet on much different things than are bets on stocks or bonds, the essence of diversification. ■

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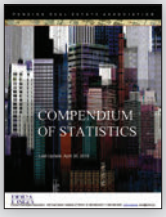

Primer on Sustainability in Real Estate—April 2018
What is sustainability and how does it relate to commercial real estate investment? This slide deck prepared by PREA provides a basic overview of sustainability concepts and relevant organizations, with links provided for those wishing further information. A synopsis of evidence on the effect of sustainability on investment performance is also provided.

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Compendium of Statistics
The Compendium of Statistics compiles data on the commercial real estate markets from various sources. The report is updated monthly or more frequently if necessary.

PREA Consensus Forecast Report—2Q18
On a quarterly basis, PREA conducts surveys of its investment manager, advisor, consultant, and research company members engaged in forecasting the US commercial real estate markets, as represented by the NCREIF Property Index.

PREA Investor Composition Survey: Core, Diversified Open-End Funds—June 2018
This report presents the results of the Investor Composition Survey of Core, Diversified Open-End Funds, conducted in May 2018.