PREA QUARTERLY

FALL 2017

A Review of Alternative Investments

A QUARTERLY PUBLICATION OF THE PENSION REAL ESTATE ASSOCIATION

According to the 2017 PREA *Investor Report,* 80% of PREA investor members that responded invest in assets other than real estate. Those assets include infrastructure, timber, natural resources, agriculture, and other assets.

If your organization invests in real assets other than real estate, indicate how you are currently invested by type.	
Infrastructure	71.4%
Timber	64.3%
Natural Resources	50.0%
Agriculture/Farm	32.1%
Other	14.3%

If your organization plans to invest in real assets in the next 24 months, indicate how you plan to invest in the future.	
Infrastructure	85.0%
Natural Resources	45.0%
Agriculture/Farm	45.0%
Timber	35.0%

Source: PREA

The primary reasons driving these investment strategies is a need to diversify and hedge against inflation. In addition, those surveyed said real assets offered stable income flows and were believed to have overall higher returns.

Obviously, real assets are here to stay as a component of investors' asset mix. Many PREA members who at one point were the real estate officers now carry dual roles, covering both real estate and real assets. Recognizing the expanding responsibilities of PREA members, the Fall 2017 issue of the *PREA Quarterly* offers a detailed review of real assets by industry leaders.

Angie Davis, President of Campbell Global, provides an overview of timberland investments. Next, Bruce J. Sherrick, Director of the TIAA Center for Farmland Research at the University of Illinois, reviews the farmland sector. The opportunities of renewable energy investments are discussed by Keith Goplerud, Economic Research Analyst at Hancock Natural Resource Group. Gary Sernovitz, Managing Director of Lime Rock Partners, discusses oil and gas investments in our fourth feature. Andrew Dietz, Managing Director, and Daniel McCormack, Senior Vice President, at Macquarie Infrastructure and Real Assets, share their insights on infrastructure. Need more? Our regular Real Assets department features a column by Dave Lowery of AXA Investment Managers—Real Assets focusing on digital infrastructure.

PREA Publications Committee

The members of the PREA Publications Committee, listed to the right, are responsible for developing the topics for the *Quarterly* and help make this a must-read industry publication. Four of our longstanding committee members, Ritson Ferguson, Robert Kochis, Christopher Longee, and Bret Wilkerson, will roll off the committee after the PREA Institutional Investor Conference in October 2017. They have served on the committee for a combined 40 years. Their insights and help with the *PREA Quarterly* have been greatly appreciated, and we thank them for their dedication to PREA's mission to serve its members engaged in institutional real estate investments through the exchange of information.

John Koza Leadership Program

For eight consecutive years, PREA has sponsored the John W. Koza Leadership Fellows, and we are pleased to again offer this benefit to investors in 2018. Investor members are encouraged to nominate candidates for the prestigious program, which is designed to familiarize investors with the educational resources available to them via PREA. Thus far, 27 individuals from 15 organizations have been named Koza Fellows. The program is named in recognition of John Koza, a longtime PREA supporter, Board Director, and from 2003 to 2004, Board Chair. For more information about the Fellows Program and to apply (or nominate) to the 2018 program, visit the PREA website at www.prea.org/awards/koza/.

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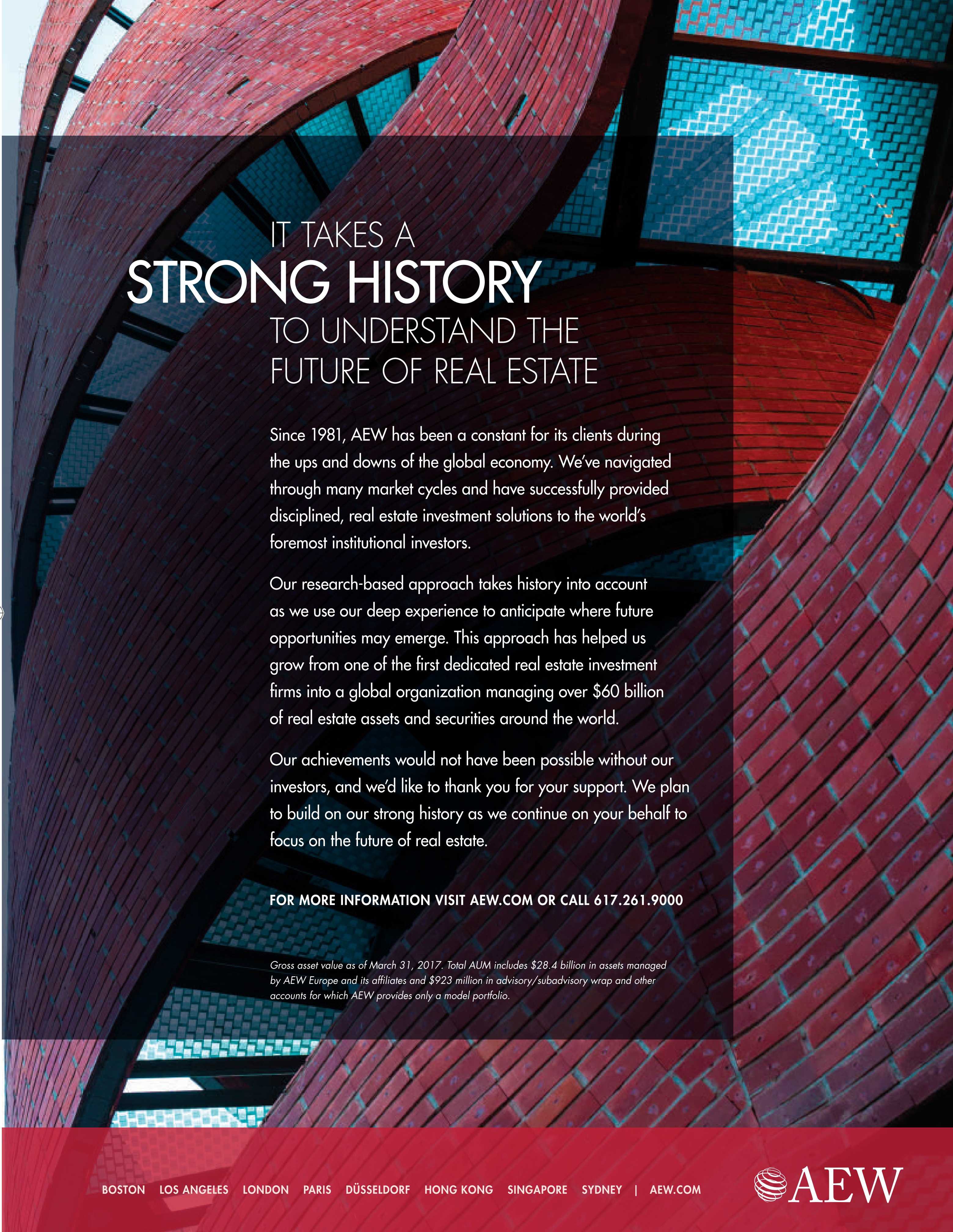
IT TAKES A
STRONG HISTORY
TO UNDERSTAND THE
FUTURE OF REAL ESTATE
Since 1981, AEW has been a constant for its clients during the ups and downs of the global economy. We've navigated through many market cycles and have successfully provided disciplined, real estate investment solutions to the world's foremost institutional investors.
Our research-based approach takes history into account as we use our deep experience to anticipate where future opportunities may emerge. This approach has helped us grow from one of the first dedicated real estate investment firms into a global organization managing over $60 billion of real estate assets and securities around the world.
Our achievements would not have been possible without our investors, and we'd like to thank you for your support. We plan to build on our strong history as we continue on your behalf to focus on the future of real estate.
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FALL 2017

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PREA supports an array of long-standing forums to fulfill its mission of helping investors learn about and understand macroeconomic, geopolitical, and other developments relevant to investment decision making. In recent years, these established platforms have been augmented by an expanding array of events and media that seek to maximize convenience and access for busy PREA members. A number of important recent examples appear below.

(1) In July, Director of Research Greg MacKinnon released a PREA *Research Report* ranking US metropolitan areas by their percentage increase in college-educated population, a correlate of economic growth and real estate returns. MacKinnon examined that statistic generally and within specific age bands, including the millennial cohort, generating lists containing some of the "usual suspect" metro areas as well as some names likely to surprise many observers. Members can view the report at www.prea.org/research/research-reports/.

(2) Also in July, the Association hosted a "PREA Near You" event in New York during which Matthew Mowell (Oxford Economics) led an interactive discussion of regional variation in US economic performance, underlining the potential for secondary cities to grab a larger share of tech employment and economic growth than they have previously. Participants asked about the tech-sector metrics on which various metro areas were assessed in a ranking Mowell shared, and spoke about the potential implications from their perspective as real estate investors.

(3) PREA organized webinar broadcasts in July, August, and September on risk measurement in real estate investment (with MacKinnon, Devon Olson of Utah Retirement Systems, and Howard Radley of Radley & Associates), 2Q2017 results of the PREA | IPD U.S. Property Fund Index (with MacKinnon and Elizabeth Francis of MSCI), and the future of the retail landscape (with Doug Herzbrun of CBRE Global Investors, John Burns of John Burns Real Estate Consulting, and Leanne Lachman of Lachman Associates). Webinars can be replayed online at www.prea.org.

Webinars and regional events are overseen by PREA's New Programs Committee, chaired by Gadi Kaufmann of RCLCO Real Estate Advisors. The committee is in the midst of planning a major enhancement to its services, an online community of PREA Networks through which members will be able to continue the conversations begun at PREA's in-person events, as well as initiate new ones. These networks stand to optimize the interactive, educational character of PREA membership and to enhance communication and collaboration on subjects of shared interest. We look forward to sharing this new member benefit with you in the coming months.

I would like to conclude on a note of thanks to PREA members for their enthusiastic participation in the fund-raising and internship campaign for the PREA Foundation, which will support the training and entry into our industry of promising college students from underrepresented backgrounds. The presence of this talent—roughly 150 interns by 2021—will have a profound effect on students' career trajectories and on the future vitality of our industry. As the original fund-raising goal of $5 million has now been reached and exceeded, the initiative's leadership has raised the target with an eye to building an endowment capable of sustaining high-level support for the foundation's work over the long term. We will present an update on the campaign's outstanding progress during the 2017 Annual Investor Conference at which this issue of the *Quarterly* will be distributed.

Regards,

Kevin Faxon

PREA FOUNDATION | Access. Inclusion. Success.

DIVERSITY AND INCLUSION STRENGTHEN THE BOTTOM LINE.

"There is evidence that investment firms with employees of varied backgrounds perform better than less-diverse firms, and that has implications for the retirement accounts of teachers, police officers, and other city employees."

Scott Stringer
NYC Comptroller

"We need to prioritize coalition building toward stronger diversity in the institutional investor industry and real estate sector."

Scott Evans
CIO, New York City Retirement System

Investing in Diversity Drives Better Results

The PREA Foundation was introduced at the 2017 CEO Leadership Forum and Spring Conference with a simple yet vitally important mission: to further the interests and values of the real estate investment community by advancing industry-wide diversity and inclusion.

A diverse workforce has increasingly been recognized as a key factor in a firm's investment performance and overall success. Investors understand the benefits achieved with a staff made up of people from different backgrounds and with different perspectives. They are now selecting managers whose own employees reflect the diverse constituencies of retirees and other stakeholders they both ultimately serve.

In order to help achieve its mission, the PREA Foundation entered into a partnership with Sponsors for Educational Opportunity (SEO) to establish the first ever Real Estate Track. SEO has a 35-year track record of providing select educational and internship opportunities to undergraduate college students from underrepresented backgrounds. The PREA/SEO Real Estate Track will be SEO Career's first program specific to real estate. What makes SEO Career complementary to other diversity programs is that the organization focuses its efforts at the undergraduate level, providing internship opportunities to sophomores, juniors, and rising seniors, those who are ready for their first full-time position. Additionally, SEO looks for talent not just at elite colleges, but at hundreds of campuses across the country.

After an initial outreach over the summer, there has been considerable interest in the SEO Real Estate Track from both students and real estate organizations, including institutional investors, offering intern positions. The first class of interns is poised to begin in the summer of 2018.

Along with the very positive responses regarding internships, fund-raising has been extremely successful. The PREA Foundation was introduced with an original goal of $5 million to be raised before the Annual Conference in October. Because of the overwhelming, industry-wide support for this initiative since its launch, that goal has been surpassed. Any additional funds raised will allow the Foundation to build and expand its programming, including the real estate track with SEO, to provide opportunities for more students and organizations alike.

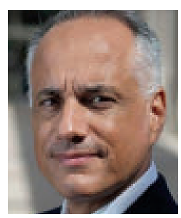
At press time, $8,070,500 in gifts and pledges has been received.

"What I have always said to my staff is you have to make the extra effort to go out and find people. We want to break groupthink. I don't want a bunch of people around that look like me and think like me. We want to have people with very diverse backgrounds that think about things in very different ways."

Christopher J. Ailman
CIO, CalSTRS

"The group is often smarter than any one individual but only if diverse thinking and debate is fostered. Leadership means empowering different opinions and being open to being challenged."

Vicki Fuller
CIO, New York State Common Retirement Fund



"I think we can do better in terms of drawing more diversity of talent into the investment office. We all know that. And we are committed to bringing as many different voices into the investment office as we can."

Ted Eliopoulos
CIO, CalPERS

For those interested in making a pledge or learning more about the PREA Foundation, please reach out to Gail Haynes at gail@prea.org. Any commitment will benefit individual participants and the industry as a whole in measurable and transformative ways.

Sometimes Expensive Markets Are Cheap, and Cheap Markets Are Expensive:
Looking Past Long-Term Averages

Greg MacKinnon
PREA

One of the fundamental questions real estate investors face is whether to concentrate on primary or secondary markets. There is no universally accepted definition of what constitutes a primary market, but it can generally be thought of as a large market with significant institutional investment. Primary markets have certain built-in advantages for large investors because of their higher liquidity and the relative ease with which capital can be put to work. For purposes of this article, however, let's ignore these, admittedly very important, factors and concentrate simply on returns.

In a recent article in the *PREA Quarterly,* authors from Deutsche Asset Management provided an excellent overview of the behavior of different types of markets and their advantages and disadvantages.[1] As part of that analysis, the authors plotted the beta (sensitivity to the cycle) of each market against its average return. Exhibit 1 here does the same, but I restricted this analysis to office markets.[2]

As theory would predict, higher beta office markets tend to have higher average returns over the full 20-year period—higher risk and higher returns do go together over the long run. The exhibit also labels the ten largest office markets by market cap in the NCREIF Property Index. Note that these primary markets generally have betas greater than one, indicating higher exposure to swings in the overall market and hence greater systematic risk. The notable exceptions (with betas below one) are Houston and Washington, DC (which tend to march to their own drummers based on oil and government), and Chicago. Generally, however, the primary office markets have greater exposure to the cycle but have earned higher total returns over the long term.

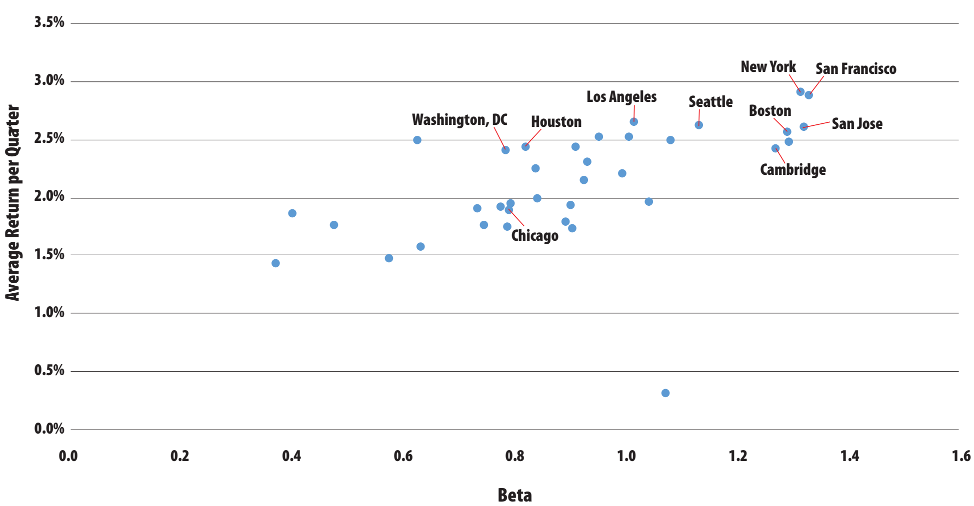
Income and Total Returns: Is There a Relationship?

A potential drawback to primary markets is that they are often seen as expensive places in which to put capital to work. Certainly, the meager cap rates currently found in major market core are a source of consternation for investors looking to acquire properties. Exhibit 2 seems to back this up. It plots the average income return (as a proxy for cap rate) in office for each metropolitan statistical area (MSA) against the average total return; both are measured from 1997 to 2016.

This look at 20-year averages again shows that the primary markets tend to group together, this time with the lowest average income returns. Given that income returns are a proxy for cap rates, this indicates that primary markets tend to be more expensive than secondary markets on average. Also clear in the exhibit is the negative relationship between the average income return and the average total return; though the primary markets tend to be more expensive on average, they also generated higher average returns over the 20-year period.

At first blush, Exhibit 2 seems to indicate primary office markets are more than able to overcome their relatively low cap rates and provide higher returns to investors over the long term. But two issues need to be considered. First, the exhibit is based on averages over 20

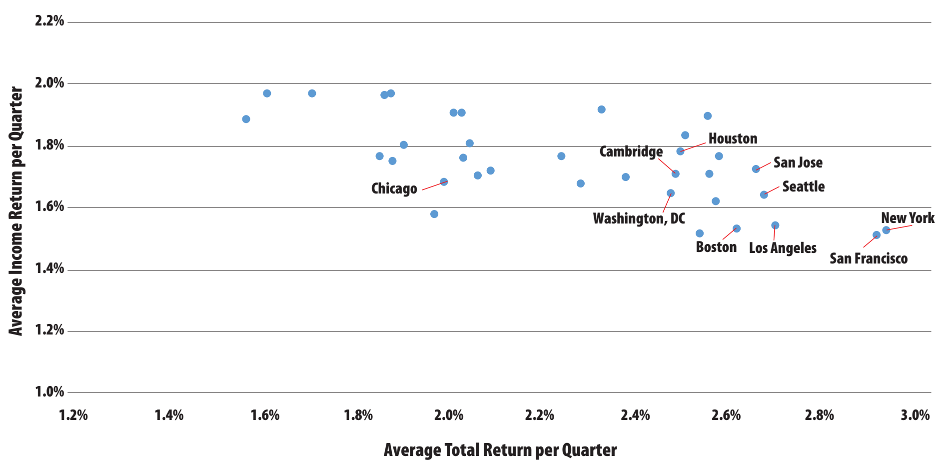
Exhibit 1: Average Total Return Versus Beta, Office by MSA



Source: PREA Research based on NCREIF data
Notes: Based on the period 1Q1997 to 1Q2017. Betas are calculated for each office market with respect to the NCREIF office index.

1. Kevin White and Mark Roberts, "Defensive Strategies for a Market Downturn," *PREA Quarterly,* Spring 2017.
2. To be consistent with the Deutsche Asset Management article, Exhibit 1 is based on the period 1997 to 2016. It includes only office markets for which at least ten years of data were available.

Exhibit 2: 20-Year Perspective on Office by MSA: Average Total Return Versus Income Return



Source: PREA Research based on NCREIF data
Notes: Office properties only. Based on the period 1Q1997 to 1Q2017.
The exhibit omits Riverside, an outlier to the others, for clarity of presentation.

years. While some investors actually do buy and hold for such a long horizon, the typical holding period for institutional property is substantially less than this.[3] Hence, other than investors who are extremely careful to put equal amounts of capital to work every year, few people actually invest at an average time. The specific conditions at the time of acquisition and disposition will affect the returns investors realize. Second, the image in Exhibit 2 presents seems to contradict recent findings from the academic literature. Work published in the 2015 issue of the PREA-sponsored special real estate issue of the *Journal of Portfolio Management* classified MSAs as having high or low income returns (i.e., cap rates) each quarter and then compared the performance of those markets.[4] The study found that, on average, high cap rate markets outperform low cap rate markets. The difference in performance was found to exist in investment horizons out to 15 years in length, although it did diminish somewhat with longer horizons.

How then to reconcile the, perhaps intuitive seeming, results shown in Exhibit 2 that primary markets provide higher average returns with the results of the more carefully done academic research? And does it really matter that Exhibit 2 is based on long-term averages? I believe these two questions are related. A particular market (e.g., New York) may have low cap rates on average over a long period of time, but that does not mean it always has lower cap rates than other markets. For example, there may be periods during which a primary market, which tends to be expensive on average, might actually have relatively high cap rates. So a typically expensive market might sometimes be cheap and correspondingly, a typically cheap market might at certain times be expensive. The academic research cited above reclassifies markets based on their cap rates each quarter; hence, it is not classifying primary markets as low cap rate but rather looking at which markets had the lowest cap rates *at that time*.

Given the high betas of primary markets, the idea that the relative cap rates in primary and secondary markets will vary over time may make sense. In rising markets, primary markets rise the most and exhibit cap rate compression. But during downturns, primary markets fall the most, leading to cap rate expansion, which can leave some of those markets with higher cap rates than many secondary markets at the trough of the cycle.

The practical implication for investors, and an explanation of the difference between the results of looking at long-run average cap rates versus cap rates at each point in time, is that market timing matters in real estate. Market timing often gets a bad rap in real estate given its illiquid nature. But by timing I am not referring to trying to predict the cycle exactly or implying investors need to get in or out of certain markets at certain times. Rather, the concept of timing I am employing here is simply that investors consider current market conditions when deciding on investment strategy—something that most investors do.

3. A study published in 2000 found the average holding period for US institutional real estate to be approximately 11 years for properties purchased in the 1980s and 1990s (Jeffrey D. Fisher and Michael S. Young, "Institutional Property Tenure: Evidence from the NCREIF Database," *Journal of Real Estate Portfolio Management,* 2000, Vol. 6, No. 2, pp. 327–338). A study on the UK market found the average holding period to be about seven years as of 1998 (David Collett, Colin Lizieri, and Charles Ward, "Timing and the Holding Periods of Institutional Real Estate," *Real Estate Economics,* 2003, Vol. 31, No. 2, pp. 205–222). Both studies found that holding periods were decreasing significantly over time; therefore, average institutional holding periods may now be less than these estimates, especially given the rise in popularity of opportunistic strategies since the studies were published.
4. Eli Beracha and David Downs, "Value and Momentum in Commercial Real Estate: A Market-Level Analysis," *Journal of Portfolio Management,* 2015, special real estate issue, pp. 48–61. This paper is available to PREA members on the PREA website at https://www.prea.org/members/portfolio-management/october-2015/.

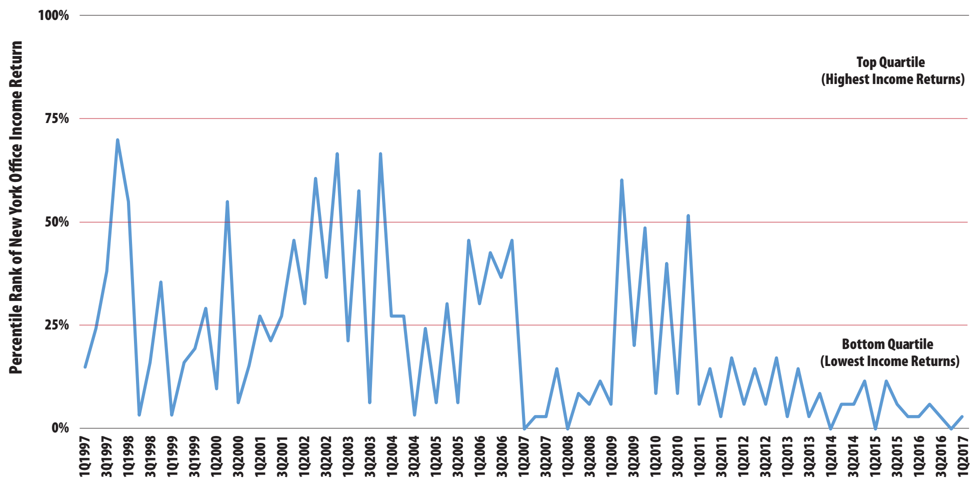
Investment decisions such as deciding on target markets should be based on conditions at the time, not on how that market is priced on average.

Market Rankings Change Over Time

Although all this may be interesting (perhaps only vaguely to some), it is really useful only if the underlying premise is actually true: Do primary markets, which are expensive on average, sometimes become relatively cheap? And do markets that are on average cheap sometimes become relatively expensive? To analyze this, I looked at each office market (i.e., MSA) in the NCREIF database between 1Q1997 and 1Q2017 with at least ten years of data. For each quarter, I ranked the income returns to office in each market and calculated the percentile rank of each market in the distribution (e.g., if a market had a percentile of 25% or less, it was in the lowest quartile of income returns that quarter; 75% or more and it was in the highest income return quartile; and if the percentile was 50%, it had the median income return). Plotting the percentile rank of a market over time reveals how its income return relative to other markets (i.e., its relative expensiveness for investment) changes over time.

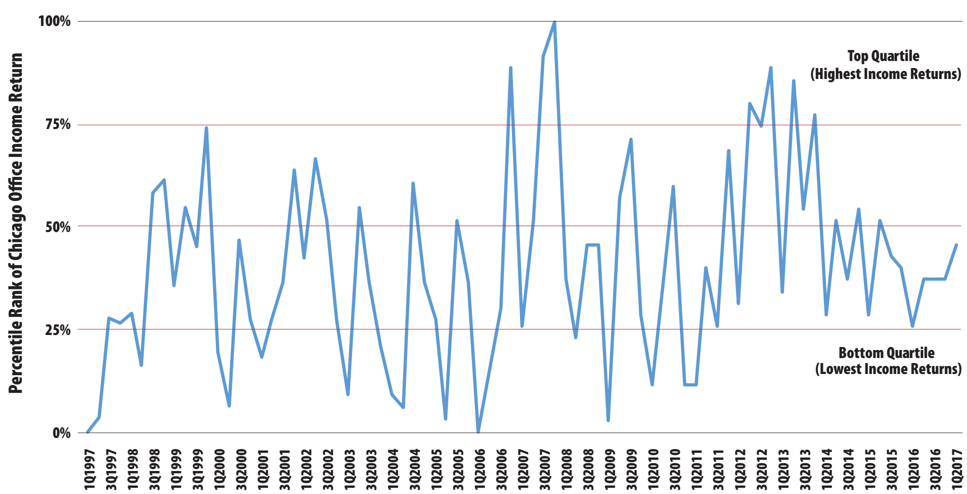
Exhibit 3 presents the results for New York office. In recent years, New York has ranked as one of the lowest income return markets, and the city has been consistently in the lowest quartile since the beginning of 2011. This should come as no surprise to those investors looking at the very low cap rates on New York office deals over the past several years. What may be surprising, however, is that there have been periods when New York office has been in the third quartile for income return among office markets. This happened in the 2009 downturn, the early 2000s, and late 1997/early 1998. At those times, New York was definitely not a particularly expensive market and was, in fact, among the lower half of MSAs when ranked by the pricing of office properties. Further, although not shown in the exhibit, if the data are extended back farther, in much of the 1980s and early 1990s, New York office was actually in the highest quartile by income return, ranking as one of the cheapest office markets by that metric. While New York has one of the lowest average income returns over the full 20-year period, there are definitely periods when it is less expensive than many other markets.

Exhibit 3: New York–Percentile Rank of Office Income Return Versus Other MSAs



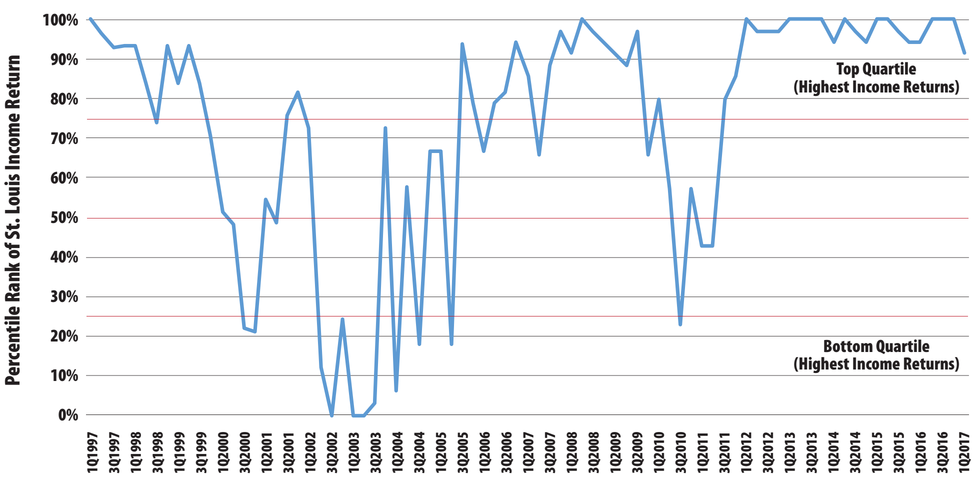
Source: PREA Research based on NCREIF data

Exhibit 4: Chicago–Percentile Rank of Office Income Return Versus Other MSAs



Source: PREA Research based on NCREIF data

Exhibit 5: St. Louis–Percentile Rank of Office Income Return Versus Other MSAs



Source: PREA Research based on NCREIF data

As further examples, Exhibits 4 and 5 present the same analysis for two other markets, Chicago (another primary market) and St. Louis (a decidedly non-primary market). Those office markets have at different times been among both the most expensive and the least expensive markets. The upshot of this is that, while a market may on average tend to have higher (or lower) cap rates than other markets, the relative pricing can vary hugely over time. Sometimes the "expensive" markets are the cheapest, and the "cheapest" the most expensive.

But Does This Affect Returns?

How much can the variation in relative pricing among office markets affect the ultimate returns to investors? Exhibit 6 shows average annual total returns over the four five-year intervals from 1997 to 2016. For each time period, the average annual returns to the markets in the top quartile by income return at the start of the period (e.g., as of 4Q1996 for the period 1Q1997 to 4Q2001) are shown along with returns to the markets in the bottom quartile by income return. Essentially, it shows the average returns over five years on the markets that were, as of the start of the period, the most expensive and the least expensive.

The important thing to note from the exhibit is that in three of four time periods, the average return to the highest income return markets exceeds the average return to low income return markets.[5] The outperformance ranges from 190 basis points (bp) per year in 1997–2001 to 50 bp per year in 2007–2011. This does not indicate that targeting high cap rate markets is a sure thing; in the most recent period from 2012 to 2016, the lowest cap rate markets outperformed by a substantial margin, during a time characterized by an extended period of cap rate compression in primary markets. What it does indicate, however, is that things change over time, and current conditions matter. Although Exhibit 2 shows the office markets that on average have low income returns provide total returns that are on average higher, over a particular investment horizon such as five years, it may very well be the high income return markets that do better (and, in fact, they do better the majority of the time).

Another important point to note from Exhibit 6 is the degree to which individual markets can vary in terms of their cap rates relative to other markets. In the four time periods in the exhibit, only one market, St. Louis, is in the top quartile in all periods. No market is in the bottom quartile by income return in all four periods. Most interesting is that there are 11 markets that are one of the most expensive markets in one time period but are one of the least expensive at another time. Looking at only the average level of cap rate or income return for a market over a long period simply does not capture the dynamics of how markets can change over time.

Conclusion

The simple analysis here is not meant to provide any definitive answers on the best investment strategy. It looks only at returns and not at other important aspects of the investment decision-making process. No adjustment was made for risk; the higher betas of primary markets should be taken into account if comparing to secondary markets on a risk-adjusted basis. Importantly, it does not include the liquidity aspect of the primary versus secondary market decision: Is it possible to put a significant amount of capital to work in smaller markets, even if one wants to target them? Is it worth the risk that exit from an investment may not be possible in the future because of lack of liquidity? How will transaction costs affect ultimate returns? Investors

5. Because the analysis incudes both primary and secondary markets, I used the equally weighted average across the markets in each time period to avoid having the results dominated by a small number of the largest markets, as would happen if the average were weighted by market value.

Exhibit 6: Average Total Returns to Office Over Five-Year Horizons—MSAs With High Versus Low Initial Income Returns

A. 1997 to 2001

First Quartile (Lowest) Income Returns at Beginning of Period: MSA	Average Total Return	Fourth Quartile (Highest) Income Returns at Beginning of Period: MSA	Average Total Return
Atlanta	10.4%	Bridgeport, CT	21.5%
Austin	16.9%	Cambridge	18.0%
Boston	17.8%	Fort Lauderdale	14.1%
Chicago	12.9%	Miami	11.3%
Los Angeles	14.0%	Minneapolis	9.3%
Sacramento	13.1%	Oakland	19.3%
Tampa	8.5%	St. Louis	13.2%
Average (Equally Weighted)	13.4%	Average (Equally Weighted)	15.3%

B. 2002 to 2006

First Quartile (Lowest) Income Returns at Beginning of Period: MSA	Average Total Return	Fourth Quartile (Highest) Income Returns at Beginning of Period: MSA	Average Total Return
Anaheim	13.6%	Dallas	7.4%
Boston	10.6%	Minneapolis	10.0%
Fort Lauderdale	12.4%	Montgomery County, PA	10.7%
Los Angeles	13.9%	Portland, OR	13.2%
Miami	11.9%	Sacramento	12.1%
Newark	11.2%	St. Louis	7.3%
Oakland	9.1%	Silver Spring, MD	15.0%
San Francisco	7.9%	Washington, DC	16.2%
Seattle	11.7%	West Palm Beach	15.6%
Average (Equally Weighted)	11.4%	Average (Equally Weighted)	12.0%

C. 2007 to 2011

First Quartile (Lowest) Income Returns at Beginning of Period: MSA	Average Total Return	Fourth Quartile (Highest) Income Returns at Beginning of Period: MSA	Average Total Return
Anaheim	−1.3%	Austin	3.2%
Boston	4.3%	Chicago	1.3%
Denver	2.5%	Houston	7.8%
Los Angeles	4.8%	Lake, Kenosha Counties, IL-WI	3.2%
Philadelphia	4.2%	Oakland	1.3%
San Diego	−2.1%	Portland, OR	2.3%
San Francisco	4.0%	Raleigh	4.8%
Washington, DC	5.1%	Sacramento	−0.9%
West Palm Beach	−3.1%	St. Louis	−0.2%
Average (Equally Weighted)	2.0%	Average (Equally Weighted)	2.5%

D. 2012 to 2016

First Quartile (Lowest) Income Returns at Beginning of Period: MSA	Average Total Return	Fourth Quartile (Highest) Income Returns at Beginning of Period: MSA	Average Total Return
Anaheim	10.1%	Fort Lauderdale	9.1%
Austin	12.2%	Lake, Kenosha Counties, IL-WI	5.0%
Denver	11.7%	Minneapolis	5.4%
Newark	2.9%	Montgomery County, PA	6.0%
New York	10.5%	Orlando	10.2%
Raleigh	7.0%	Philadelphia	10.9%
Riverside	7.3%	St. Louis	4.1%
San Francisco	15.8%	Silver Spring, MD	0.8%
Washington, DC	5.7%	Tampa	8.8%
Average (Equally Weighted)	9.2%	Average (Equally Weighted)	6.7%

Sources: PREA Research based on NCREIF data

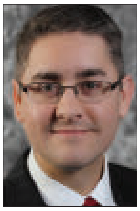
need to consider all these issues along with simple returns.

There is no single, right answer to the primary versus secondary market question. But that is really the point; too often investors are faced with plots such as Exhibit 2 and decide the primary markets do better, and therefore there is no reason to even consider other markets given their inherent liquidity issues. My point here is not that secondary markets are better or worse than primary from a return perspective, but simply that there is no single right answer (and what answers there are likely change over time).

To many it may come as no surprise that there is no one type of market that always outperforms. This is especially so since looking at things on a market level is painting with a pretty broad brush. The recently released 2017 special real estate issue of the *Journal of Portfolio Management*, sponsored by PREA and available to members at www.prea.org/members/portfolio-management/, includes a paper I had the privilege to work on with two academic coauthors (Eli Beracha of Florida International University and David Downs of Virginia Commonwealth University) that takes a different look at the issue. Rather than looking at market-level returns, it looks at things property by property, classifying individual properties as high or low cap rate and comparing the returns to investors. What this more-detailed look reveals may surprise some in the industry, as it does come up with a pretty definitive answer—high cap rate properties outperform and do so almost all the time, across the cycle and across all property types. As always with this type of research, the jury is still out, but that research paper does provide some very interesting evidence, and I encourage those interested to take a look at the full paper on the PREA website. ■

Greg MacKinnon (greg@prea.org) is the Director of Research at PREA.

Examining the Uptick in REIT M&A Activity:
What It Says About the Market



Eric Rothman
CenterSquare Investment Management

After a lull in the pace of mergers and acquisitions in the US REIT market, a surge of activity began midway through the second quarter of 2017 and into July and August. Only one traditional merger was announced in the fourth quarter of 2016 (Regency Centers' $6 billion acquisition of fellow shopping center REIT Equity One), only two in the third quarter of 2016, and 2017 also started off slowly. However, after two announcements in February, a shift occurred between late April and early July when six separate transactions totaling $20.6 billion were announced. Then in August, one of the biggest REIT mergers in years was announced—the $7.8 billion "merger of equals" between Starwood Waypoint Homes and Invitation Homes.

Interestingly, the announced mergers covered a number of different property sectors, including lodging, health care, data centers, office, apartment, and single-family rentals. The deals included a mix of big and small, as well as new and old REITs. Consideration ranged from all cash to stock for stock to a combination of cash and stock. Transactions included business combinations, takeovers, and go-private deals. Some announcements were welcomed by the public markets, and others left investors with questions.

Why the sudden uptick in REIT M&A activity? No two mergers or acquisitions are identical, and each has its individual circumstances. Timing is difficult to predict, with some transactions in the works for months and others coming together quite quickly if conditions are right. That said, we believe underlying market and cyclical conditions laid the groundwork for the increase in M&A activity.

Favorable debt capital markets and a stable fundamental outlook are prerequisites for large entity-level transactions. Buyers today are confident about the fundamental outlook. Sellers who have failed to gain sufficient scale or achieve a competitive cost of capital are finding that the quickest path to rectifying their situation is to join forces. Private buyers can arbitrage the disconnect between certain discounted REIT valuations and higher private-market values—every once in a while, one plus one equals more than two. But motivations for merging will always be questioned, and the acquirer must have a good rationale. Acquirers that can solve some fundamental problems are more likely to be successful.

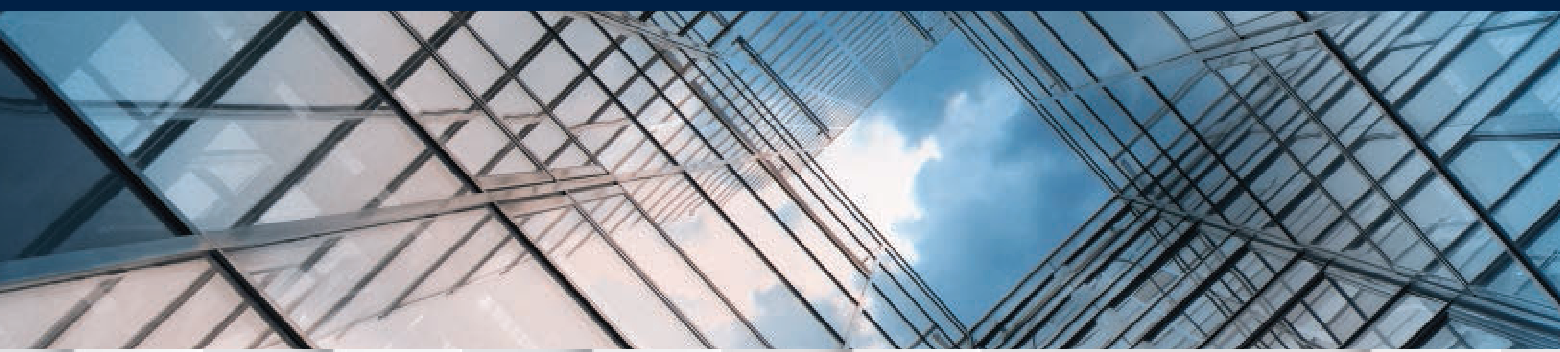
Why Mergers Occur and Why They Don't Occur

The strongest hand doesn't always win—there must be a willing seller. Hostile bids are rarely successful—just look at Simon Property Group's unsuccessful bids for rivals Taubman Centers, General Growth Properties, and Macerich Corp. If a REIT has no intention of being acquired, there is little a suitor can do. Entrenched management and boards have a myriad of corporate governance tools they can employ to thwart takeovers. For this reason, hostile takeovers are quite rare in the REIT space. A would-be acquirer needs to do more than simply raise its bid.

An Array of Social Issues Is the First Hurdle

Before a board and management team conclude it is time to sell, they first consider the so-called social issues. Social issues are the emotional, human, and non-numerical factors for which the offer price means less. Mergers that solve for social problems have the highest probability of success.

Perhaps the most obvious social issue is that the management team is putting itself out of a very lucrative job. If its members are at the wrong point, from their perspective,



in their careers, they have little incentive to seek a sale no matter the external or practical pressures. REITs with older management teams, those with ill-defined succession plans, or those young enough to resurrect themselves in a new REIT are the most likely to be sellers. REITs with strong family connections or whose executives are unlikely to get a second chance at managing another REIT are the most hesitant to sell, in our experience.

Inside ownership can both facilitate and impede the merger process. If insiders hold sufficient stock to outweigh the downside from putting themselves out of a job, it can be helpful. The less stock insiders hold, the less incentivized they are to sell. Conversely, very high insider ownership can impede the merger process as it can represent a powerful tool to thwart an unwelcome suitor. This is all the more true when insiders hold super voting rights by a fault in corporate governance structures.

Taxes can also be a significant hindrance. Because many REITs are the products of decades-old businesses built by individuals through the accumulation of assets with roll-forward bases, the tax consequences of an all-out sale can be enormous. The deferment of capital gains taxes over these long periods can result in enormous tax bills for certain individuals. The different tax bases of insiders and shareholders is often an invisible source of conflict. Although this can be structured around, suitors that fail to account for this important issue can run into material opposition.

The Influence of the Cycle and Market's Signal

One REIT's ability to acquire another is most often a function of its cost of capital advantage. Immediately following the global financial crisis, the REIT market experienced a "rising-tide-lifts-all-boats" phenomenon, in which most real estate firms benefited from a recovering market. In the ensuing years, many REITs focused on disposing of the non-core albatross assets and on reducing the financial leverage that was impeding their recoveries. As the cycle has progressed, this phenomenon has passed. Winners and losers have become more clearly defined today.

As the cycle has progressed, REITs that have gotten their houses in order are in a position to press their cost of capital advantage and expand via M&A. Based on valuations, the market is signaling to REITs that enjoy a cost of capital advantage to use that advantage to grow and gain scale. Conversely, the market is telling REITs that have been unable to attain sufficient scale or attract sufficient capital to effectively execute their business plans that the current course of action requires a change. That change may be an outright sale.

Need for Scale

Competitive pressures, public company expenses, Sarbanes-Oxley compliance costs, and the need to be sufficiently diverse have put increasing pressure on small public companies. REITs that once could thrive with a $500 million capitalization have found that the bar is set much higher today. In the increasingly regulatory-heavy public sphere, dramatically higher compliance and regulatory costs have forced some smaller companies onto the auction block. Companies that are too small struggle for relevance with investors, making it difficult for them to achieve an efficient cost of capital.

Need for Accretion

A cost of capital advantage on its own is insufficient to entice a merger. The obvious would-be candidates are often poor fits for REITs with an existing cost of capital advantage. A target REIT needs to represent a compelling opportunity, and there must be strategic value to the combination. Getting bigger is not the same as getting better; acquirers must strengthen their portfolios, and growth must benefit shareholders. A REIT will lose its cost of capital advantage if it uses it unwisely.

Cost synergies are often cited as key drivers of M&As. The most immediate cost savings often come from poorly run companies. An interesting by-product of REITs' focus on improving efficiency the past few years may have had a detrimental impact on mergers. As REITs get stronger and more efficient with purged portfolios and streamlined operations, these synergies can be realized.

Alternatively, M&A can be used as an entry point into a new strategy or geographic market, or it can be used to eliminate a perceived deficiency in a REIT's strategy or area of expertise. Because the bar is very high for any REIT attempting to shift its focus or expand into a new area, some-

times an effective way for a REIT to move into a new area is to acquire an expert in that area.

Public-Private Arbitrage

The discount or premium between publicly traded REITs and private real estate drives a lot of M&A activity. We estimate that today the REIT market as a whole trades roughly at net asset value. However, by our estimates, certain REIT sectors trade at significant discounts to net asset value (retail and office, for example), and others trade at significant premiums (net lease and heath care). When the public market is trading at a discount to private market value, it creates an advantageous environment for private investors to buy publicly traded firms. If private-market investors can purchase real estate assets for less than the cost of building or buying those assets individually by acquiring a public REIT, they will. Alternatively, when public REITs trade at a large premium to net asset value, they can use their cheap cost of capital to buy private companies and assets. The recent increased M&A activity supports this thesis, as there have been both go-private transactions and acquisitions of private portfolios by public companies.

Outside Agitators

Activist investors are rising in influence in the REIT space. Their mere presence can be enough to shake boards of entrenched or underperforming REITs to rethink their strategies by highlighting the disparity in value and or insufficient history of generating returns to shareholders. Though the pressure applied is mostly in the court of public opinion, these activist investors can generate a lot of bad press. The weaker the history of generating performance for shareholders, the greater the risk of becoming an activist target. Activist investors have fed the increase of M&A activity within the real estate market in recent years. Notwithstanding the controversies some of these investors have generated, they have pushed several subpar, inactive, or absentee boards to take notice, answer tough questions, and explore strategic alternatives.

An Attractive Offer Is in the Eye of the Beholder

We believe the vast majority of REIT boards and management teams take their fiduciary duty to shareholders very seriously. A rejected offer is hardly a failure of corporate governance. In fact, it is often the opposite. A firm may not believe it is being offered a fair price. Offers need to be vetted in the context of the REIT's long-term value. A premium offer relative to today's value may be a large discount to tomorrow's value. Boards are charged with a fiduciary responsibility to all shareholders, not just to the interests of the most vocal or short-term investors.

When Mergers Happen for the Wrong Reasons

Price and value considerations should be paramount but are not always so. Some M&A transactions irreparably damage companies. Paying too high a price can permanently hamper growth. Questionable motives—such as a management team's securing its own job by purchasing a second firm—can be a nonaccretive disaster that investors will not easily forgive. Occasionally, a company acquires another in an effort to dilute risks embedded in its own portfolio. Although the original risk may be reduced, the risk embedded in the acquired firm must be absorbed. When a large, expensive, and high-profile deal goes bad, it often costs management executives their jobs.

Conclusion

Today's real estate fundamentals, accommodative credit markets, and the relative valuation gap some REITs hold over others have made for a fertile M&A landscape, in our view. Relative valuations and discounts/premiums to net asset values will ultimately be arbitraged. Regardless of the direction—public to private or vice versa—as smaller or weaker companies are absorbed or acquired, the overall health of the REIT market improves as a result of the excision of that underperformance. Stronger REITs with bigger platforms, better margins, attractive costs of capital, and access to capital are more relevant to all investors. US REITs have used the rising real estate cycle of the past several years to sharpen their sector focus, systematically improve their portfolios, and reduce their financial leverage. An entity-level transaction that furthers any of these goals should be welcomed. ■

Eric Rothman is a Portfolio Manager at CenterSquare Investment Management.

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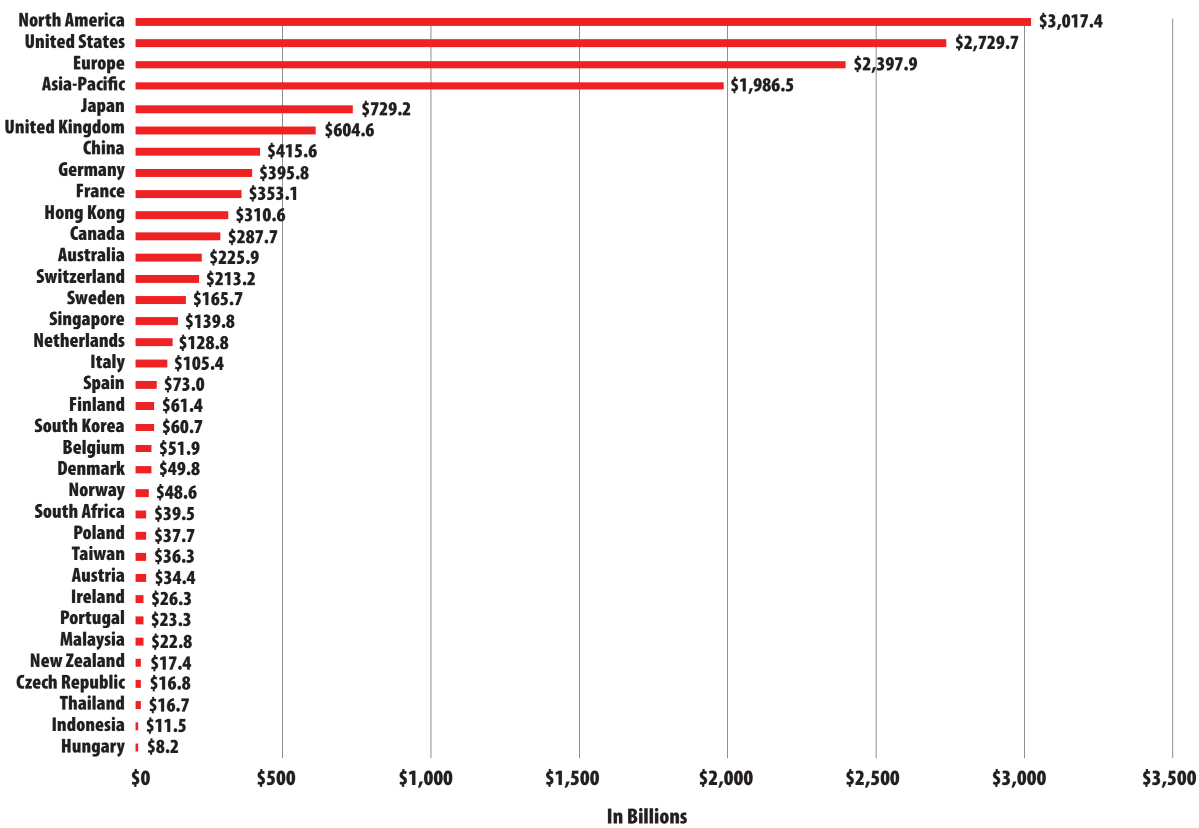
The average US institutional investor allocation to property now stands at slightly more than 10%, the highest level ever and more than twice the level reported as recently as 2000.[1] Clearly, US institutions like what real estate does for their portfolios. At the same time, US institutional investors show less home country bias than do investors in other countries, with roughly 20% of property holdings outside the US, comparable to Australia and trailing only Canada among the larger institutional investor countries.[2] While a 20% allocation to non-US property is significant, it is not clear that such a target is truly sufficient for long-term investors. One simple metric for allocating across global markets would be in proportion to the relative sizes of the professionally managed real estate investment markets. Exhibit 1 illustrates the relative size of the individual country markets but also aggregates the individual countries to create North American, European, and Asia-Pacific totals. By size of market alone, this would suggest rough allocations of 35% for North America, 35% for Europe, and 30% for Asia-Pacific.

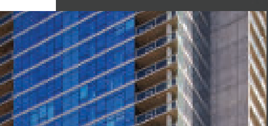
Just as they care about absolute market size, institutional investors likely also care about the depth of the market and transaction volumes, which may be a rough proxy for market depth (liquidity) and the ability of markets to absorb large-scale institutional capital. Exhibit 2 shows the trailing annual transaction

1. David L. Funk, "Real Estate Takes Its Place as the Fourth Asset Class," *Development Magazine*, NAIOP, Spring 2015.
2. Jean-Martin Aussant, Per Hobbes, Yang Liu, and Peter Shepard, "The Erosion of the Real Estate Home Bias," MSCI/IPD, November 2014.

Exhibit 1: Estimated Size of Professionally Managed Real Estate Investment Markets (2016)



Source: MSCI/IPD



volumes of the four major commercial property types (apartment, industrial, office, and retail) across the three major global regions. While total transaction volume in the Asia-Pacific region is roughly half the North American average, Europe tends to show equal or greater volume of commercial property trades as North America. Again, this would argue for somewhat comparable portfolio allocations to North America and Europe and somewhat smaller allocations to the Asia-Pacific market (40% to North America, 40% to Europe, and 20% to Asia-Pacific).

Investment Performance by Region

Consistent global property return data, while greatly improved over the past decade, remain more limited than the data investors have grown accustomed to for the US and the UK. Despite limitations, the available data does provide some insight into the opportunity presented by cross-border investment as well as the opportunity cost of home country bias. Exhibit 3 summarizes the broad region-level comparison of investment returns by property type. In each case, we have highlighted both the highest absolute return and the highest risk-adjusted return for the period 2005 to 2016. In every case, the best performance over the prior decade was somewhere outside the US or, in the case of office property investment, the North American region (including the US).

Exhibit 3: Commercial Property Investment Returns by Property Type and Region

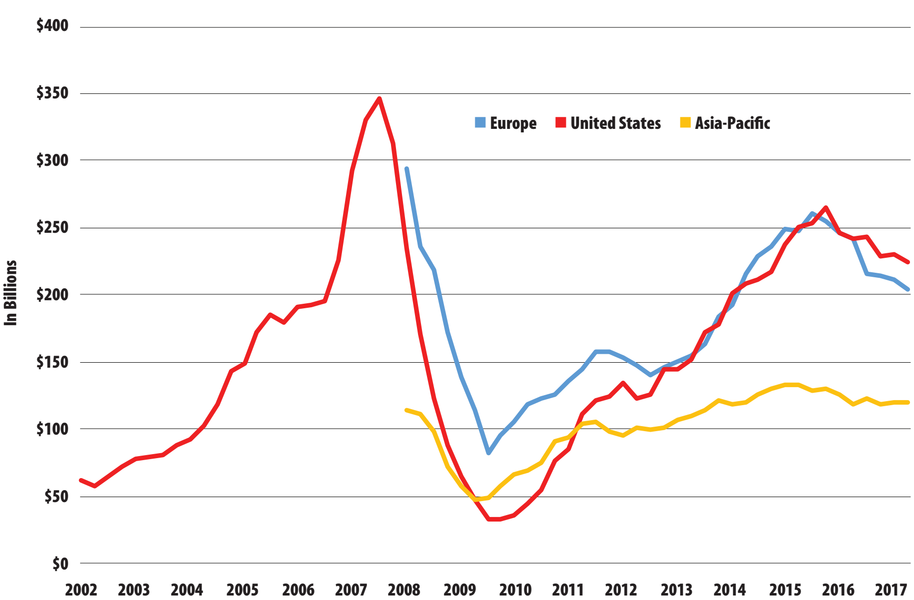
	Average Annual Return* 2005–2016	Standard Deviation	Sharpe Ratio†
INDUSTRIAL			
Asia–Pacific	8.32%	8.56	0.85
Pan–Europe	4.16%	13.16	0.24
North America	7.72%	10.05	0.66
US	7.81%	10.54	0.64
OFFICE			
Asia–Pacific	6.84%	8.93	0.65
Pan–Europe	4.34%	10.99	0.30
North America	7.07%	10.94	0.55
US	6.83%	11.48	0.50
RESIDENTIAL			
Asia–Pacific	5.01%	9.85	0.40
Pan–Europe	6.58%	9.28	0.60
North America	6.06%	11.31	0.44
US	6.04%	11.56	0.43
RETAIL			
Asia–Pacific	9.54%	5.81	1.46
Pan–Europe	3.93%	12.07	0.24
North America	7.61%	8.74	0.75
US	7.57%	9.40	0.69

Source: MSCI/IPD
* Returns are in US$ (i.e., not hedged).
† The average 30-day US T-bill rate from 2006–2016 was used as the risk-free rate (1.05%).

These results, while intriguing, are specific to a relatively brief time period and tell only part of a more complicated story. The Asia-Pacific region clearly performed well economically and in terms of property investment through the financial crisis period, and certainly the opposite was true during earlier periods. More important, region-level aggregates also mask compelling individual local market differences.

Exhibits 4–7 highlight the top 15 global markets by 2016 transaction volume for the four property types as well as the total return for the property types between 2005 and 2016. These exhibits identify the stronger-performing markets that also demonstrate institutional liquidity. Among the office markets, Sydney recorded the highest absolute

Exhibit 2: Commercial Property Transaction Volume by Global Region (Rolling 12-Month Total)



Source: Real Capital Analytics

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Exhibit 4: Top 15 Office Markets by Transaction Volume

Metro Area	2016 Volume (In Billions)	Average Annual Return 2005–2016	Standard Deviation	Sharpe Ratio
New York	$29.344	8.21%	13.87	0.52
London	$19.252	9.62%	14.54	0.59
Paris	$18.344	8.39%	7.94	0.92
Los Angeles	$14.832	6.92%	13.30	0.44
San Francisco	$14.456	9.16%	15.84	0.51
Tokyo	$13.214	4.13%	6.88	0.45
Hong Kong	$9.490	NA	NA	NA
Shanghai	$9.490	NA	NA	NA
Seoul	$8.230	9.69%	6.05	1.43
Washington, DC	$8.101	5.43%	9.74	0.45
Boston	$7.904	7.35%	12.03	0.52
Amsterdam	$7.005	5.78%	6.26	0.75
Dallas	$6.209	5.64%	9.87	0.46
Sydney	$6.022	10.01%	7.97	1.12
Chicago	$5.740	5.80%	8.39	0.57

Sources: Real Capital Analytics, MSCI/IPD

Exhibit 6: Top 15 Industrial Markets by Transaction Volume

Metro Area	2016 Volume (In Billions)	Average Annual Return 2005–2016	Standard Deviation	Sharpe Ratio
LA/Orange/County/Riverside	$8.532	8.37%	11.42	0.64
Bay Area	$5.909	9.63%	13.67	0.63
NY/NJ	$4.946	8.33%	9.56	0.76
Chicago	$3.662	5.70%	9.60	0.48
Sydney	$2.758	9.51%	7.64	1.11
Dallas	$2.443	8.03%	8.95	0.78
Hong Kong	$2.268	NA	NA	NA
Miami/South Florida	$2.228	7.05%	12.30	0.49
Seattle	$2.046	8.87%	9.97	0.78
Boston	$1.997	5.81%	9.70	0.49
Paris	$1.913	10.17%	8.33	1.10
London	$1.803	8.62%	12.27	0.62
Atlanta	$1.769	6.86%	11.46	0.51
Toronto	$1.586	6.36%	6.62	0.80
Washington, DC	$1.539	7.70%	10.92	0.61

Sources: Real Capital Analytics, MSCI/IPD

Exhibit 5: Top 15 Retail Property Transaction Volume by Metro Area

Metro Area	2016 Volume (In Billions)	Average Annual Return 2005–2016	Standard Deviation	Sharpe Ratio
New York	$7.239	9.23%	9.65	0.85
Los Angeles	$6.519	7.86%	10.43	0.65
Las Vegas	$4.513	NA	NA	NA
Chicago	$4.427	6.53%	10.18	0.54
London	$4.297	8.17%	11.81	0.60
Hong Kong	$3.943	NA	NA	NA
Dublin	$3.653	1.65%	22.77	0.03
San Francisco	$3.218	7.59%	9.34	0.70
Miami	$3.059	9.07%	9.71	0.83
Paris	$3.051	10.60%	7.04	1.36
Shanghai	$2.975	NA	NA	NA
Tokyo	$2.542	4.74%	5.32	0.69
Washington, DC	$2.340	5.99%	9.34	0.53
Beijing	$2.208	NA	NA	NA
Sydney	$2.190	9.10%	6.00	1.34

Sources: Real Capital Analytics, MSCI/IPD

Exhibit 7: Top 15 Apartment Markets by Transaction Volume

Metro Area	2016 Volume (In Billions)	Average Annual Return 2005–2016	Standard Deviation	Sharpe Ratio
NYC Metro	$19.755	3.03%	13.82	0.14
LA Metro	$11.939	6.10%	11.99	0.42
Dallas	$9.421	7.75%	9.10	0.74
Atlanta	$9.012	8.10%	11.68	0.60
Denver	$6.699	10.62%	11.29	0.85
SF Metro	$6.100	9.84%	12.21	0.72
Miami/South Fla	$6.070	4.85%	12.77	0.30
DC Metro	$5.957	6.37%	11.40	0.47
Seattle	$5.650	6.92%	14.40	0.41
Phoenix	$5.377	4.32%	13.75	0.24
Houston	$4.859	7.52%	9.36	0.69
Chicago	$4.593	8.19%	10.75	0.66
Austin	$4.014	8.65%	11.02	0.69
Berlin	$3.326	7.25%	3.15	1.97
Amsterdam	$2.916	6.09%	8.24	0.61

Sources: Real Capital Analytics, MSCI/IPD

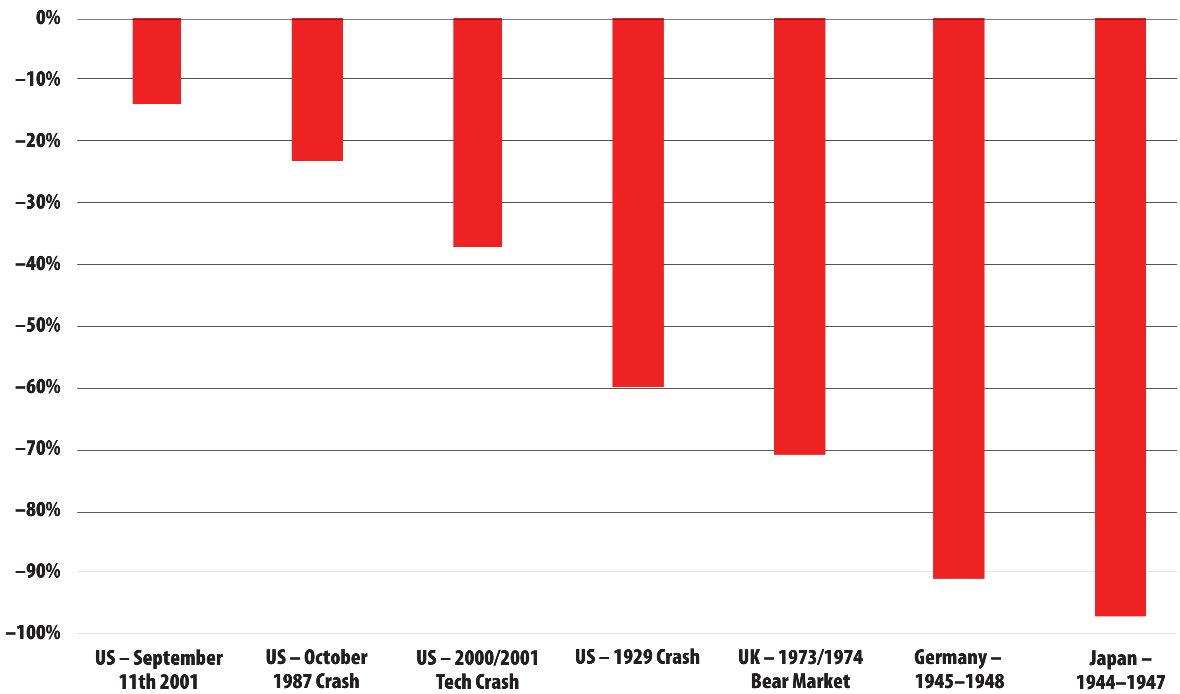
level of return, and Seoul demonstrated the greatest risk-adjusted return. For retail property markets, Paris was the clear leader on both measures, with strong showings by New York, Sydney, and Miami. Within industrial markets, Sydney narrowly led in risk-adjusted returns, with Paris the leader in total returns. Finally, within residential markets, Denver and San Francisco strongly outperformed in absolute returns, and Berlin was a clear leader in risk-adjusted returns. Again, despite data limitations, adding exposure to markets beyond the home country can contribute to both return and risk reduction.

Final Thoughts

In their seminal work, *Triumph of the Optimists,*[3] Dimson, Marsh, and Staunton developed and analyzed a comprehensive set of equity and fixed income return data across 16 countries over more than 100 years (1900–2002). While documenting the higher long-term absolute return of equities, they also demonstrated the greater risk of equity markets and the importance of global diversification. Imagine investors in 1900 faced with developing equity and fixed income portfolios comprising the major economies of that time.[4] Where would they invest? Would they

3. Elroy Dimson, Pau Marsh, and Mike Staunton, *Triumph of the Optimists: 101 Years of Global Investment Returns,* Princeton University Press, 2002.
4. Dimson, Marsh, and Staunton developed return data for Belgium, Italy, Germany, France, Spain, Japan, Switzerland, Denmark, the Netherlands, the United Kingdom, Canada, the United States, South Africa, Sweden, and Australia.

Exhibit 8: Select Periods of Significant Equity Market Loss



Source: Elroy Dimson, Pau Marsh, and Mike Staunton, *Triumph of the Optimists: 101 Years of Global Investment Returns,* Princeton University Press, 2002.

overweight the fast-growing but volatile US that had only recently recovered from the Civil War, or would they concentrate their positions in the developed and liquid markets of Europe? As shown in Exhibit 8, in at least two examples, equity investors would have lost nearly all their capital with single-country investments (Germany and Japan post World War II) as would have bond investors (Germany post World War I). The point of this illustration is that investors simply do not have perfect foresight of future events, and prudence alone argues for meaningful multicountry exposure. ■

Michael Acton is the Director of Research and a Managing Director at AEW Capital Management L.P.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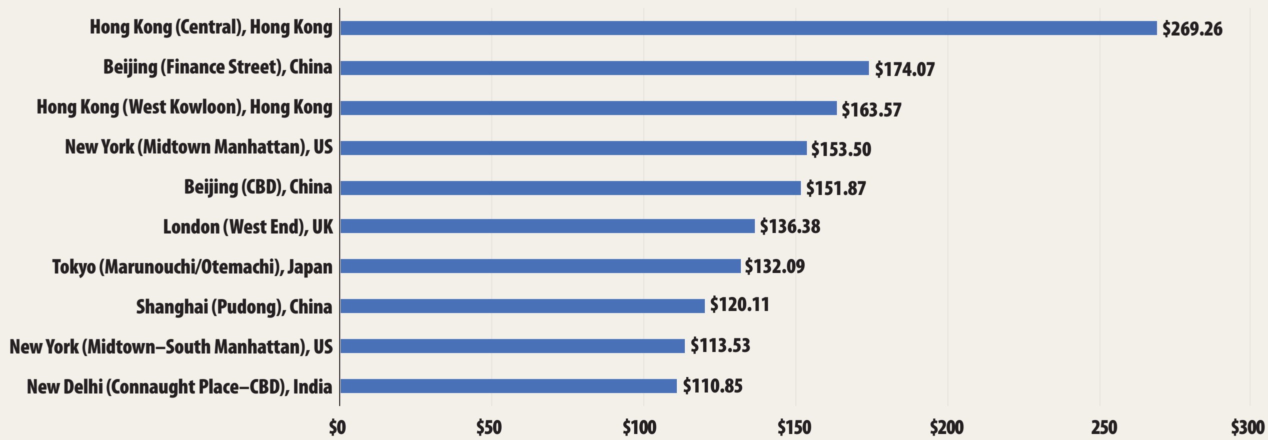
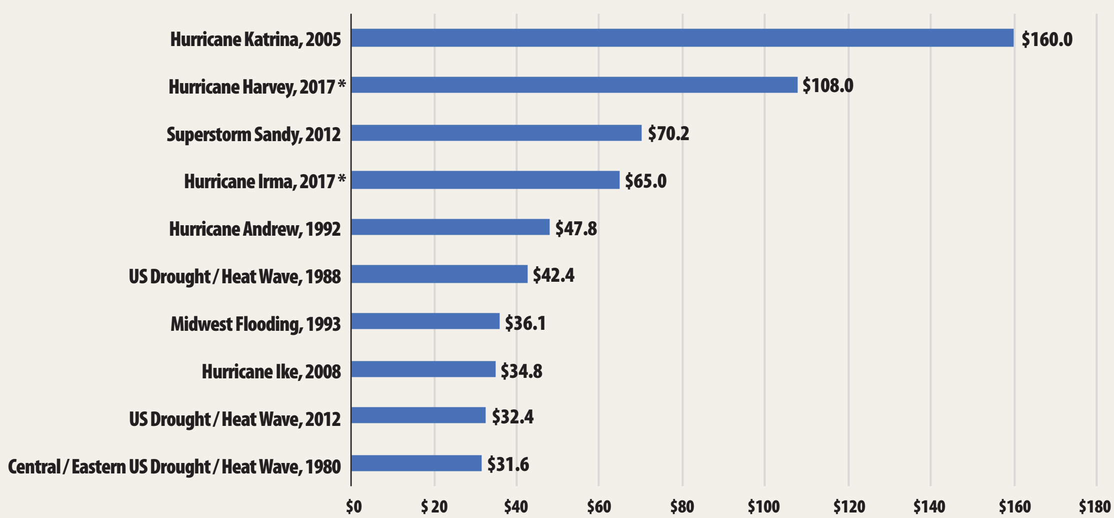
Snapshots

Top Ten Most Expensive Office Markets (US$ per Square Feet per Annum)



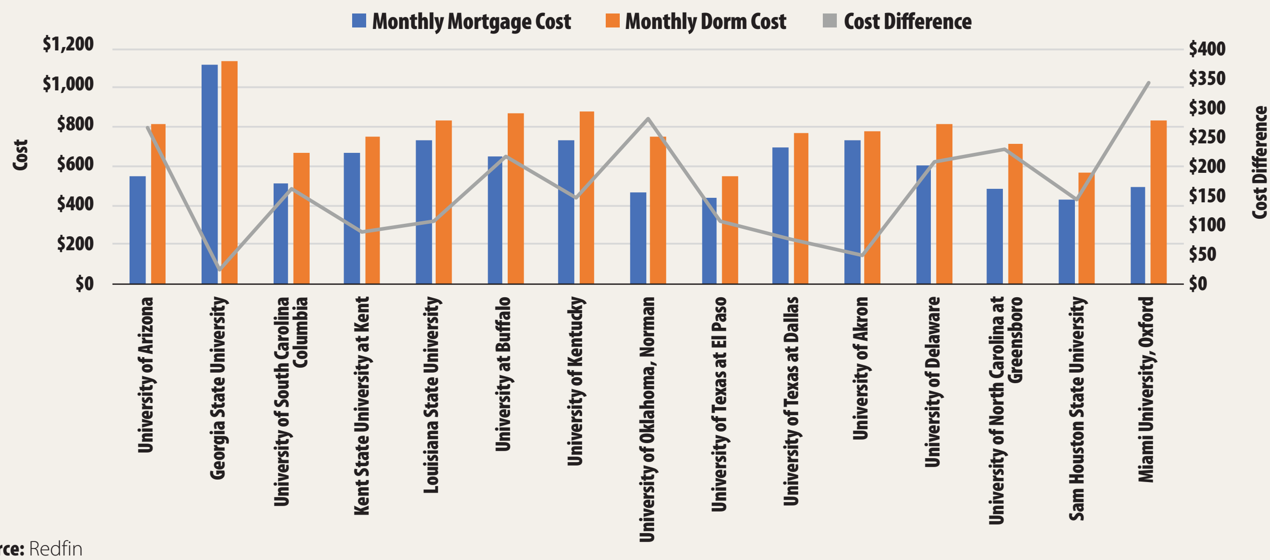
Source: CBRE, Global Prime Office Rents survey, 2Q2017

The Ten Costliest Natural Disasters in US History (Cost in Billions)



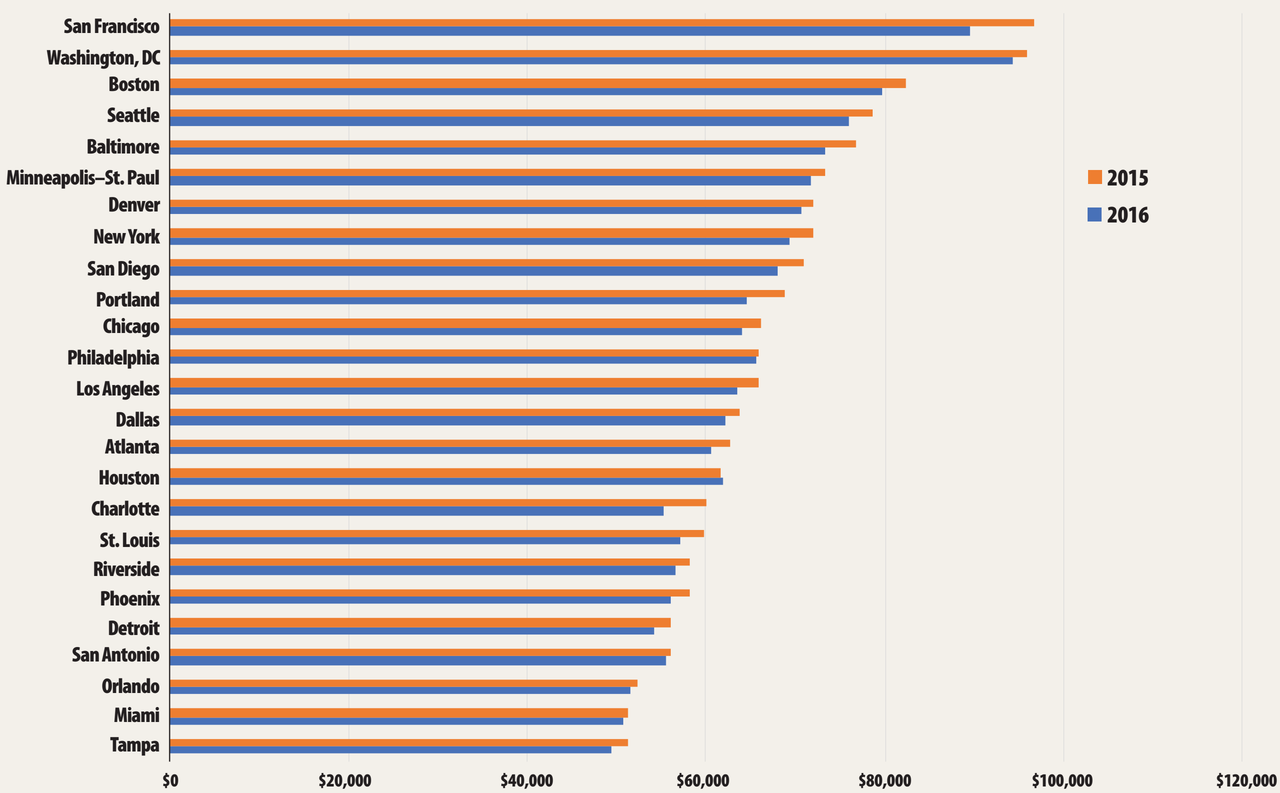
Sources: National Centers for Environmental Information, Moody's Analytics, Corelogic, CNN Money, Reuters
*Hurricane Harvey and Hurricane Irma costs are estimated.

15 Colleges Where Buying a Condo Is Cheaper Than Paying for a Dorm



Source: Redfin
Note: Colleges are listed by enrollment size.

Median Household Income—25 Most Populous Metropolitan Areas



Source: US Census Bureau: 2015 and 2016 American Community Survey

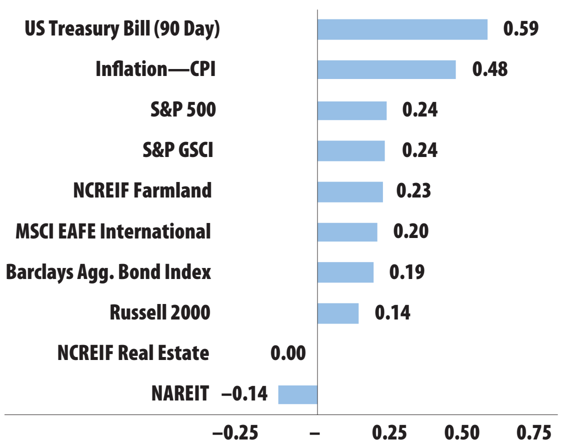
Timberland

Yields Long-Term Gains in Diversification, Net Income, And Responsible Investing

Timberland emerged in the early 1980s as an asset class for institutional investment. Today, more than $100 billion of institutional capital is invested in timberland worldwide—most of it in the United States—and approximately $65 billion is managed by timberland investment managementor oganizations, such as Campbell Global. ■ While timberland is often included in a real estate allocation, its characteristics differ significantly from commercial real estate. Both timberland and real estate use real property, or land, to support income-generating activities; however, there are few other shared attributes. Land value for commercial real estate may include a significant percentage of total property value for core properties, but land value makes up a relatively small percentage of total value for mature timberland. ■ Historically, annual timberland returns demonstrated low, and in some cases even negative, correlations when compared to other assets, thus providing enhanced diversification to an overall portfolio. This low correlation supports the inclusion of timberland in a diversified portfolio, and indicates that lowered risk, as measured by the standard deviation of portfolio returns, may be realized by allocating a percentage of portfolio assets to timberland. ■ A correlation analysis between commercial real estate and timberland, as measured by the FTSE NAREIT US Real Estate Index and NCREIF Timberland Index, illustrates this negative correlation (Exhibit 1). In general, real estate has not been correlated with timberland returns because of fundamentally different business and economic drivers.

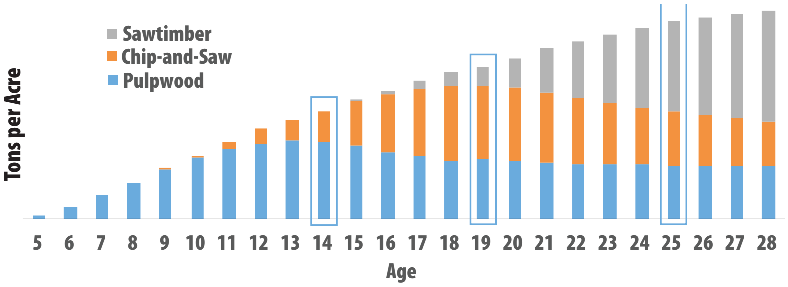
Angie Davis
Campbell Global

Exhibit 1: Correlations of Select Asset Class Indices to NCREIF Timberland Index, 1987–2016



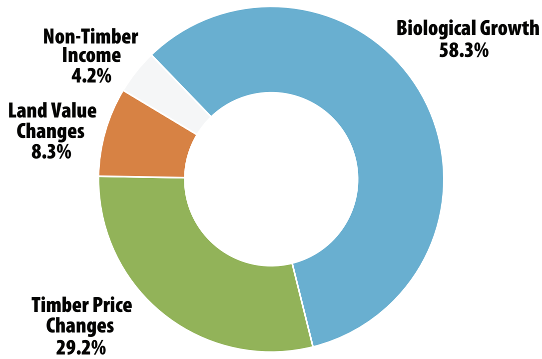
Sources: NCREIF, NAREIT, S&P, Bloomberg, MSCI, FTSE, Russel, Federal Reserve

Exhibit 2: Biological Growth and Product Changes of Loblolly Pines in the US South



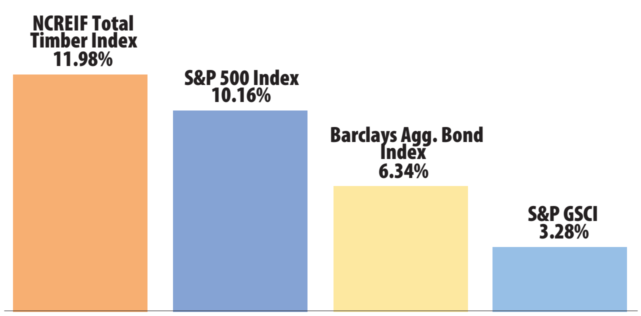
Source: Campbell Global

Exhibit 3: Typical Timberland Investment Return Attributes



Source: Campbell Global

Exhibit 4: Timberland, Commodities, Bonds, and Stocks, 1987–2016



Sources: CG, NCREIF, S&P, Bloomberg

More recently, because of low-yielding fixed income assets and timberland's ability to generate yield, timberland has been used as a substitute for fixed income. Today, the primary drivers for investors' interest in timberland are diversification, net income, positive risk-adjusted returns, and environmentally responsible investing.

Store on the Stump

Timberland is quite literally a growing asset. It requires moderate-to-low capital investment over time relative to asset value. It generates income through the harvesting and selling of logs, which are sold to companies that produce a multitude of wood-based products. Uniquely, timber can be "warehoused" by simply not harvesting—stored on the stump, in other words.

The concept of warehousing timber by delaying harvesting highlights the main driver of the lack of correlation of returns—biological growth. Biological growth is the component that separates timberland from other investment types, providing potential appreciation independent of economic and financial markets. The benefit of biological growth is that as trees mature, they add value by gaining volume, which may in turn translate into higher-value products, as illustrated in Exhibit 2.

Consider loblolly pine, the predominant species in the southern US. In the South, the trunk of a 14-year-old loblolly pine tree is approximately 7 inches in diameter, a pulpwood-sized tree. Pulpwood-sized trees are primarily used to manufacture paper and packing products. At 19 years old, the tree trunk will be near 9 inches in diameter, which generally puts it in the chip-and-saw range—mostly used to produce intermediate-value products such as small-dimension lumber and composite building panels. By age 23 to 25, the trunk has a diameter of approximately 13 inches to 15 inches, and the tree is classified as sawtimber. Sawtimber is used to manufacture lumber, plywood, paneling, furniture, and flooring—the highest-value products.

It should be noted that biological growth can vary widely, based on species, growing conditions, climate, and management practices. Active management of forest resources enables harvests to produce cash flow and influence the generation of enhanced returns. Campbell Global utilizes sophisticated models to perform cost-benefit analyses that aid in determining optimal management treatments and can maximize growth rates and increase returns. Decisions such as when, or if, to thin a stand of trees or to apply fertilizer can have a material impact on growth rates and the value of a timberland property. Additionally, we frequently develop export strategies to diversify our customer base and create market tension for our products. Ultimately, this should lead to higher pricing and reduced risk, which positively affect returns.

The ability to store on the stump allows investors the latitude to realize cash returns when market demand and pricing dynamics are most favorable. Timber harvests can be adapted to timber price movements to reduce market exposure and mitigate risk. Because of the biological growth component, unharvested trees continue to grow and add value over time. When used effectively, this cash flow flexibility can lower the standard deviation of timberland returns, mitigate short-term log price fluctuations, and augment price increases.

Investment Returns

In addition to biological growth, three other primary components contribute to total timberland returns: timber price changes, timberland value changes, and non-timber income (Exhibit 3).

Timber prices are derived from demand for wood products. As end-product prices fluctuate, so do the prices for wood fiber. While short-term price fluctuations impact the cash return generated from a property, short-term price changes have not historically translated into significant changes in timberland values. This is partly a result of expectations that market participants will defer harvests in weak markets. In addition, most participants will use a discounted cash flow model with a price forecast that converges on a long-term trend price based on long-term fundamentals, which tends to stabilize value. Changing expectations surrounding long-term price trends can impact price forecasts used in timberland valuations, and might influence the overall investment return.

Land value typically accounts for a smaller portion of the total timberland investment return. Bare land value fluctuates based upon the supply and demand of the land available for timber production as well as changes in demand for alternative uses, such as agriculture, recreation, bioenergy production, and "higher and better use." Changes in demand for alternative uses can provide upside potential to land value because of increased appreciation and may contribute incrementally to the total return.

Recreational licenses and leases for hunting and fishing, mineral rights, rights-of-way, mitigations banking, and carbon offset markets are examples of non-timber income sources that provide opportunity to add value to timberland investments.

Historically, timberland has outperformed many other asset classes. NCREIF publishes a Timberland Property Index patterned after its Property Index, which is well known for measuring commercial real estate returns. NCREIF compiles data from members who submit return information specific to the properties they manage. Those data become the basis for the composite return figures for the timberland asset class in the US. As evidenced in Exhibit 4, timberland returns, represented by the NCREIF Timberland Index, have outperformed stocks and long-term corporate bonds since 1987.

The NCREIF Timberland Index generated a 7.06% total return over the past five years (through December 31, 2016). Depending on the region in which one invests in the US, returns can differ materially. For example, the NCREIF Timberland Index for the US South returned a total of 6.07%; in comparison, the US Northwest returned 10.61% during the same five-year period (ending December 31, 2016).

Timberland returns vary between geographies based on growth cycles (average time from planting to harvest age); product mix (i.e., sawtimber or pulp); product pricing; in-country (domestic) demand; export opportunities and pricing; and other regional, national, and international economic factors, in addition to the skill and expertise of the investment advisor.

As discount rates in the US have compressed over time because of broad market yield compression and overall market efficiencies, many investors have looked outside the US to generate excess returns, further diversify their timberland portfolios, and take advantage of global supply-and-demand trends.

Timberland investments in Australia and New Zealand, two core, well-established timber markets, can typically expect to realize moderately higher investment returns compared to those in the US, depending on individual tax outcomes and assuming one is investing in established plantations. Countries in Latin America, such as Chile, Brazil, and

Uruguay, may offer even higher projected returns, depending on the opportunity.

Investors are better able to mitigate risk and maximize returns with a well-diversified portfolio. A global portfolio, targeting investments in core timberland markets globally, can take advantage of both local domestic markets and continued strong demand from Asia, through export markets, helping to mitigate pricing risk and fluctuations in supply and demand.

Investing in the Environment

In early 2005, the United Nations created its Principles for Responsible Investment, which were launched in April 2006. In 2016, the Paris Agreement, forged at the 2015 COP21 United Nations Climate Change Conference, was ratified. Both have helped guide investors focused on investing their assets responsibly. Timberland is well suited for investors focused on environmental, social, and governance (ESG) issues. Campbell Global has focused on investing in plantation or working forests—forests that have traditionally been managed for industrial purposes for decades and sometimes hundreds of years, which we manage sustainably.

Plantation forests provide a sustainable source of timber for forest products, helping to prevent the degradation of native forests such as those in the Amazon region. Forests are natural carbon sinks, meaning they capture and store carbon from the environment. Depending on the type of forest (existing or greenfield) and management regimes, investments in timberland can reduce carbon footprints. In addition to capturing carbon and providing clean air, most properties have favorable environmental attributes, such as watersheds, providing clean water and fisheries habitats, and valuable biodiversity.

Importantly, enhancing environmental attributes on a timberland property does not need to detract from total investment return. For example, Campbell Global initiated the development of a carbon project in the state of California. This project was part of an active management strategy developed to generate additional value from a preexisting conservation easement on a property we manage on behalf of a client. In addition to generating additional cash flow, the project provided environmental benefits that went beyond climate protection through carbon sequestration. By implementing carbon protocol standards, the project promotes the maintenance of species diversity, helps to prevent erosion, improves water quality, and safeguards natural landscape aesthetics.

In addition to the environmental benefits, timberland investments provide important social benefits. Most timberland investment companies are an integral part of the towns and regions in which they operate and help provide economic stability to the employees, families, and communities that depend on them.

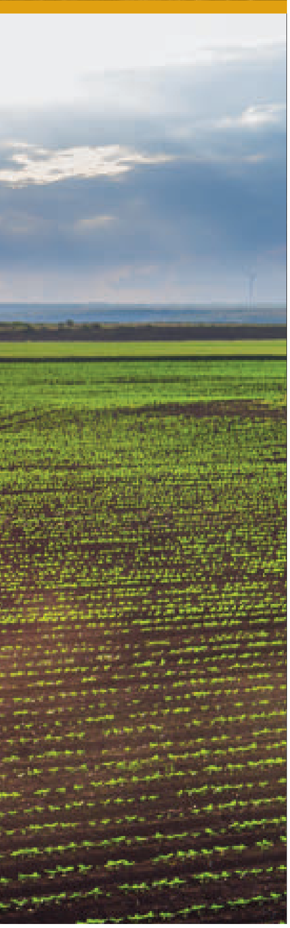
Governance begins at acquisition, ensuring that the investment is structured properly to meet clients' risk and return objectives and their desired level of control. Good governance is integral to active management. It may include creating best management practices that meet or exceed state and federal standards and certifying a property via a third-party certification standard. Certification standards include the Sustainable Forestry Initiative (predominantly in the US), the Forest Stewardship Council in Latin America and New Zealand, and the Australian Forestry Standard in Australia. We also include client reporting in governance, reporting not only traditional performance metrics but impact metrics as well. Impact metrics can include trees replanted, carbon sequestered, acres of watersheds protected, and the protection of biodiversity, including endangered species.

At Campbell Global, we continually strive to invest responsibly and incorporate ESG policies into our investment framework. As part of our continued evolution, we established a Responsible Investment Committee and became a signatory of the UN Principles on Responsible Investment. In the future, we anticipate that timberland will play a larger role in investors' portfolios as responsible investing and integration of ESG attributes continue to rise in importance.

In summary, timberland can play an important role in an institutional investor's portfolio, providing diversification, net income, and attractive risk-adjusted rates of return while also strongly aligning with a responsible investing/ESG framework. ■

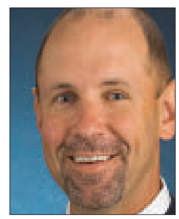
Angie Davis is President of Campbell Global.

Understanding Farmland Investments



Pension funds and institutional investors understandably seek assets that offer strong returns and meaningful diversification for their portfolios. Additionally, pension investors typically seek relatively longer-duration investments that also hold values well in periods of uncertain inflation. Farmland has emerged as a potential asset class of interest as its historical performance is exceptionally strong and displays low or negative correlation with traditional equity returns and positive correlation with inflation. It can be, however, a somewhat complicated asset to acquire, manage, and dispose of because of the low turnover and relatively unique transactions involved. When included in traditional mixed-asset portfolios, farmland offers substantial diversification potential and typically improves risk efficiency and thus still warrants consideration for inclusion in investment portfolios in the future.

Returns to farmland investments are driven by a complex set of factors including variables that affect expectations about agricultural returns, macroeconomic conditions, market structure, and policy; farmland prices also exhibit substantial variation across locations as a result of urban influence, agricultural production practices, crop suitability, and state and local policies. In addition, several key characteristics of the farm real estate market and agricultural production more generally make farmland distinct from other asset classes. As access to the asset class becomes more routine, it is important to examine the performance and potential role in diversifying a traditional portfolio. This article outlines the characteristics of the sector and the performance of farmland investments, identifies some key factors influencing its future, and discusses its potential future role in pension fund and institutional investor portfolios.



Bruce J. Sherrick
University of Illinois

Scale and Composition

The US agricultural sector has an aggregate value of just over $3 trillion as of mid-2017, according to the US Department of Agriculture Economic Research Service (USDA-ERS), and about 84% of that total is held in real estate (Exhibit 1). Amazingly, total debt is only $390 billion, or 12.7% of asset

Exhibit 1: Select Balance Sheet Characteristics of US Agriculture Sector (In Millions Except Ratios)

	1970	1980	1990	2000	2010	2013	2015	2017
Farm Assets	**$278,823**	**$1,000,422**	**$840,609**	**$1,203,215**	**$2,170,832**	**$2,776,110**	**$2,909,653**	**$3,074,869**
Real Estate	$202,418	$782,820	$619,149	$946,428	$1,660,114	$2,251,002	$2,395,363	$2,556,932
Non–Real Estate	$76,405	$217,602	$221,459	$256,787	$510,718	$525,108	$514,290	$517,937
Farm Debt	**$48,501**	**$162,432**	**$131,116**	**$163,930**	**$278,931**	**$315,332**	**$356,738**	**$389,965**
Real Estate	$27,238	$85,272	$67,633	$84,724	$154,065	$185,161	$208,769	$242,418
Non–Real Estate	$21,263	$77,160	$63,483	$79,206	$124,865	$130,172	$147,969	$147,547
Equity	**$230,322**	**$837,990**	**$709,493**	**$1,039,285**	**$1,891,902**	**$2,460,777**	**$2,552,915**	**$2,684,904**
Selected Indicators								
Debt/Equity	21.1%	19.4%	18.5%	15.8%	14.7%	12.8%	14.0%	14.5%
Debt/Assets	17.4%	16.2%	15.6%	13.6%	12.8%	11.4%	12.3%	12.7%
Real Estate/Equity	87.9%	93.4%	87.3%	91.1%	87.7%	91.5%	93.8%	95.2%
Real Estate/Assets	72.6%	78.2%	73.7%	78.7%	76.5%	81.1%	82.3%	83.2%
Real Estate D/Total D	56.2%	52.5%	51.6%	51.7%	55.2%	58.7%	58.5%	62.2%

Source: USDA–ERS

Exhibit 2: Asset Return Characteristics

Asset/Index	Annual Average Return	Standard Deviation	Coefficient of Variation	Correlation
		1980–2016		
US Avg. 32 States	**8.55%**	**5.32%**	**0.621**	**1**
S&P500	8.19%	15.87%	1.936	–0.132
NASDAQ	9.63%	25.14%	2.611	–0.118
EAFE	6.11%	20.61%	3.375	–0.281
AAA	7.56%	2.82%	0.374	–0.059
TCM10Y	6.32%	3.23%	0.510	–0.013
Mort30F	8.10%	3.40%	0.420	–0.022
All REITS	10.29%	17.08%	1.659	–0.043
Gold	2.18%	16.09%	7.391	–0.128
CPI	3.10%	2.10%	0.679	0.390
		1990–2016		
US Avg. 32 States	**9.27%**	**3.54%**	**0.381**	**1**
S&P500	6.84%	17.22%	2.519	–0.122
NASDAQ	9.15%	26.93%	2.942	–0.157
EAFE	1.76%	19.99%	11.377	0.027
AAA	6.15%	1.57%	0.254	0.153
TCM10Y	4.74%	1.85%	0.391	0.250
Mort30F	6.39%	1.76%	0.275	0.252
All REITS	9.74%	18.68%	1.918	–0.150
NCREIF Total Farmland	11.85%	6.66%	0.562	0.634
Gold	3.91%	14.29%	3.654	0.049
CPI	2.41%	1.13%	0.471	0.223
		2000–2016		
US Avg. 32 States	**9.09%**	**4.36%**	**0.480**	**1**
S&P500	2.48%	18.31%	7.390	–0.166
NASDAQ	1.65%	26.69%	16.216	–0.226
EAFE	–0.26%	21.85%	–84.108	–0.023
AAA	5.23%	1.11%	0.212	0.205
TCM10Y	3.60%	1.20%	0.334	0.409
Mort30F	5.37%	1.27%	0.237	0.377
All REITS	10.88%	19.19%	1.763	–0.166
NCREIF Total Farmland	13.69%	7.58%	0.554	0.721
Gold	8.08%	14.99%	1.855	0.043
CPI	2.12%	1.03%	0.487	0.288

Source: USDA–ERS

values. Perhaps even more surprisingly, real estate debt is proportionally lower at only 62% of total debt at $242 billion—and that number has actually increased recently from its low of roughly 50%. The relatively low aggregate leverage represents a potentially attractive feature in terms of aggregation and return leverage, but historically, isolated ownership and low cash flow relative to total returns have limited the ability to actively manage the capital structure in individual holdings. The USDA-ERS also reports that, in aggregate, farmland has increased in value at an annual rate of 6.5% since 2010 and by 4.6% in 2017. These capital gains rates are in addition to annual income and reflect the highly diversified nature of US agriculture in total. Row crop farms have had cyclically lower performance recently, and permanent crops have had better recent experiences, for example, but what may be of most interest is the performance of a fairly diversified institutional investor.

Returns Performance

Data on individual farmland performance are somewhat difficult to assemble; most farmland is held by individuals, and return data are not collected or reported to any single source. Moreover, agricultural income is determined only annually in most cases because of the yearly production cycle of most crops. However, the USDA does conduct annual surveys of farm-level performance with a wide array of indicators included, and NCREIF publishes an aggregated index across its reporting members that own and manage farmland, both of which allow important indicators of financial performance to be examined.

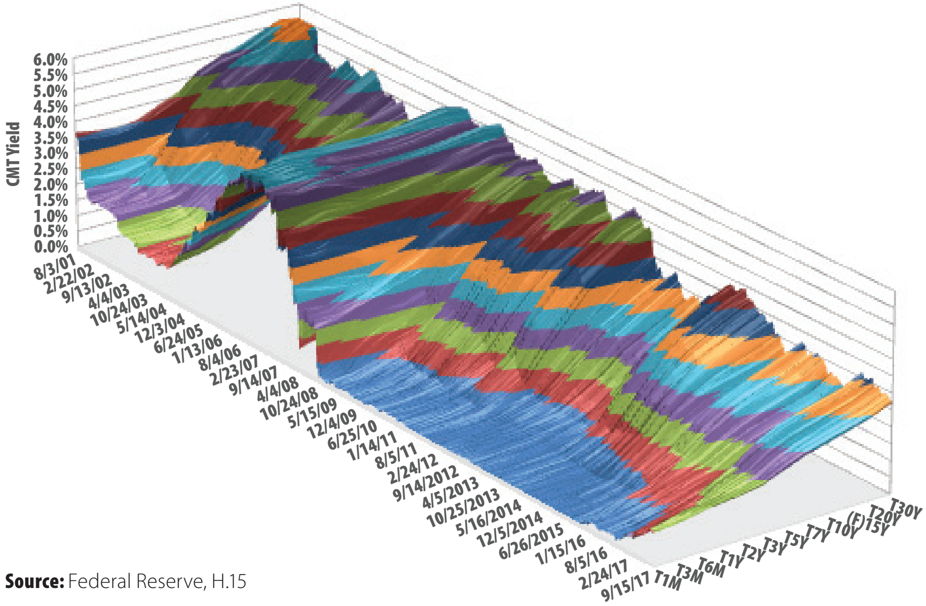
Exhibit 2 provides returns to farmland investments (income plus capital gain less property taxes) across various subperiods along with summary correlation measures of aggregate farmland returns to other key investment categories. Among the observations are that farmland has very competitive returns in aggregate but, more notably, has displayed a negative correlation with equities, a near-zero correlation with fixed income investments, and a positive correlation with inflation for virtually any subperiod examined. These features are relatively stable across each of the subperiods and are key in assessing the impact of inclusion of farmland in a traditional investment portfolio.[1]

1. These results are constructed from aggregate USDA state-level data across the 32 states with the greatest value of agricultural production and include results of all farms, not just commercial-scale operations. In comparison to NCREIF returns, which are more representative of farms managed as active investments, the aggregated USDA-based returns tend to be as much as 200 bps lower, but they also display less variability because of the larger universe of investments represented. The NCREIF Total Farmland Returns series is available from 1991 to the present. Equity index returns include only changes in index values.

Does the Farmland Market Make Sense?

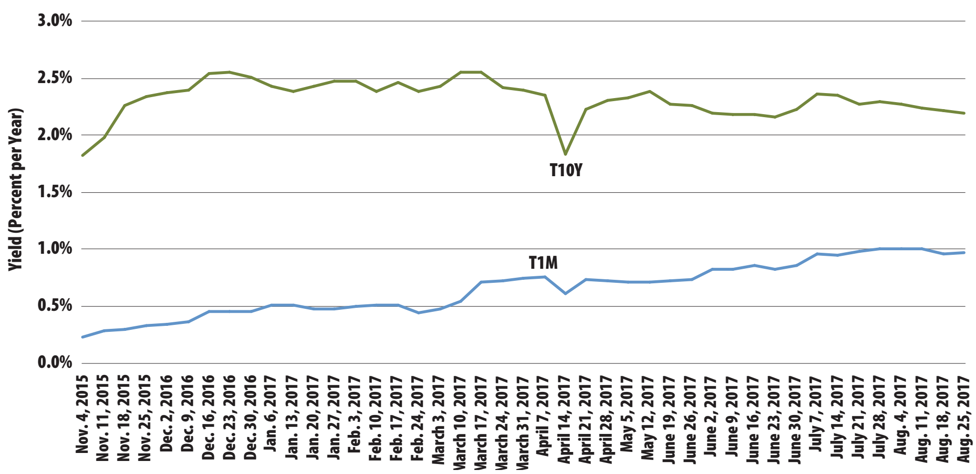
At a basic level, farmland markets should behave similarly to other income-generating assets and have prices that reflect the underlying expectations about future income, income growth potential, and the cost of capital supporting the investment in the asset. In row crop regions of the US, asset values had a remarkably common pattern of appreciation through roughly 2014, with varying declines for a couple of years thereafter. Many observers of land markets in the Midwest have begun to indicate that a soft bottom seems to be forming and have noted that overall price changes have been less responsive relative to current incomes than is typical in other real asset markets. Questions that often arise are why farmland prices (and return patterns) seem to respond less to changes in current income than other assets, and what implied cap rates seem to be generated. A somewhat overly simplified explanation is that each year's income is simply a realization from a set of possible values, largely a result of weather and current world demand–supply fundamentals and that these patterns take several years to adjust on a world basis. In other words, the expectation of future income, its growth, and the cost of controlling invested capital move slowly because of the long duration and non-depreciable nature of the underlying asset. An analogy that is sometimes made is that current income is to long-term expected returns as weather is to climate. Realizations of the former (income or weather) are used in the formation of expectations of the latter (expected long-term income or climate), but it takes a great deal of information and perhaps several years to fully adjust expectations.

Exhibit 3: Treasury Yield Curve, Weekly (8/31/17 to 9/15/17)



Source: Federal Reserve, H.15

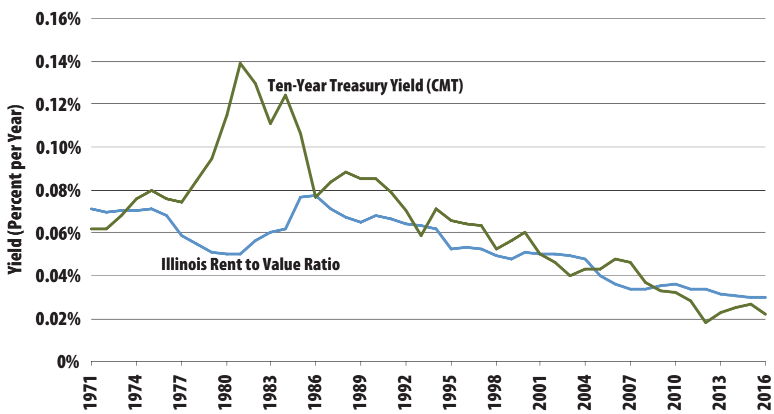
Exhibit 4: CMT10 and CMT1 Treasury Spread Yields (November 2016–August 2017)

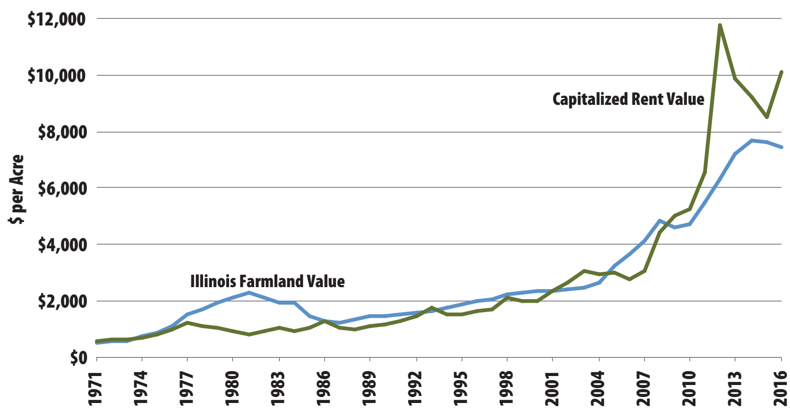


Source: Federal Reserve, H.15

On the cap rate side of the argument, a couple of graphic representations are provided for context. First, Exhibit 3 shows a long period of weekly US Treasury yields. As is well understood, the post-crash short end of the yield curve has been at historically very low, stable levels. The liquidity "puddle" that seems to have formed at the short end of the yield curve only recently had its front periods elevated through the series of Federal Open Market Committee rate increases. Exhibit 4 compares the one-year and ten-year constant maturity terms (CMT) on the yield curve since one month prior to the first post-crash rate increase in December

Exhibit 5: Farmland Capitalization Rate, CMT10, and Income Relationships, 1971–2016





Sources: Federal Reserve, H.15, ERS, and author's calculations

2016. What is most notable might be that the compression of rate spreads and economy-wide "multiple expansion" that many regard as the new norm do not seem to have been affected in clear fashion by each of the rate increases. Interpreted another way, it seems that each of the rate increases was fairly well anticipated and consistent with the understood cost of capital driving asset values. In a more direct manner, Exhibit 5 shows two related concepts using Illinois farmland as an example. The top chart shows the implied cap rate against the ten-year Treasury yield, and the bottom chart shows implied asset values against actual when current income is simply divided by the most recent ten-year CMT rate. In the top chart, it seems that the farmland current yield is fairly consistent with the CMT10 except in the early 1980s, when the divergence from fundamentals was fueled by idiosyncratic policies and lending practices that do not exist today. In the bottom chart, it is notable that farmland values did not fully respond to increases in incomes that occurred in the mid-2010s but rather displayed a more measured response consistent with an understanding that the income realizations seemed greater than the longer-term expectations. While space prevents a more complete presentation of the nuances of these arguments, a summary of this information seems to be that farmland markets are indeed reasonably rational and do not seem to be set up for an irrational period of high or low returns relative to longer-term fundamentals.

Market Issues: What's the Ticker Symbol for Farmland?

Given the previous discussion and the historical performance of the asset class, one might expect it to be offered in a deeply traded and well-understood platform. However, there remains a different form of the "equity puzzle" in this asset class—one that has begun to change but with a pace toward a more-complete financialization that is difficult to predict. In simplest terms, there is no broadly available, well-functioning equity market for agricultural real estate, and individual owners still represent a large share of operators. There have been great advances in development of ag-related funds and institutional platforms for holding ag investments, and there is an increasing acceptance of greater separation of ownership and operation. These hold the promise of providing steps toward more standardization or access to equity investments in the asset space, but the total fraction of the $3 trillion sector represented in these cases remains fairly small.

Another feature of the asset class that helps demystify why return premiums seem to have been sustained is that there is incredibly low primary turnover in farmland markets. A 2013 study by the University of Illinois showed that only about 1% of farmland turns over at arm's length each year. Considerably more has changing title, but the majority is a result of estate settlements within families and transfers among related parties. Simply put, it is a difficult asset to acquire at scale in a short period of time, and the "excess returns" that may appear to exist in naïve assessments of historical performance represent market frictions and liquidity premia to a large extent. Additionally, the acquisition and management platforms required to meaningfully operate in this space represent substantial investments and cannot be expected to exist for one-time rebalancing efforts. TIAA is among a select few that have made a significant commitment to the infrastructure needed to operate in this space and has done so with an internationally active scope as well. Other notable firms have also begun to emerge to create aggregated holdings through special purpose vehicles and farmland funds with management company wraparounds. The interest in this activity and the set of structures is evident by the roughly 600–700 attendees at each year's Global Ag-Investing conference.

In addition to the growing existence of farmland fund management companies and fund platforms, publicly traded farmland REITs have also emerged as vehicles to allow investments to be made into the asset class. Although the two most visible publicly traded in the US (Farmland Partners [FPI] and Gladstone [LAND]) have begun to make inroads, they are each still very small relative to the scale of the sector. Still, these REITs are viewed as critically important efforts in the ongoing maturation of the market and the eventual development of an equity market that allows direct access to returns from investments in farmland.

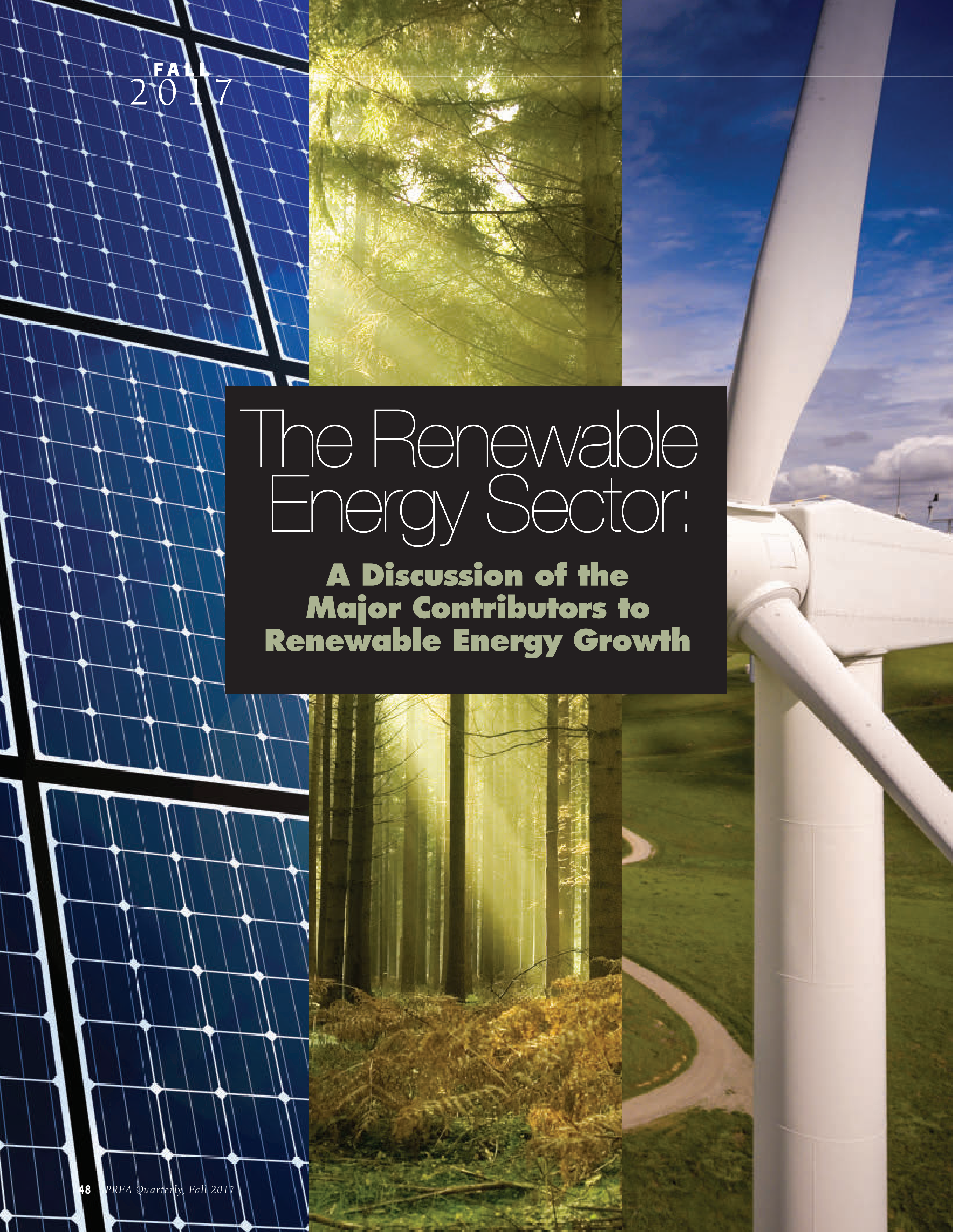
Future Issues

The investment thesis for farmland and base connections to the importance of feeding the world's growing population seems stable in the long term if access to the asset class becomes more routine. In simplest terms, the locations of populations will remain relatively fixed, but the density will continue to increase. Likewise, locations where land is suitable for crop production are very fixed, with continued intensification highly likely. Water resources, even if made more variable through time, are likely to be increasingly constrained but are not especially mobile. Thus, the remaining major factor influencing demand for productive farmland is the growth in standards of living for emerging populations as the caloric quality increases, as higher-quality proteins are consumed, and as food grains are diverted to feed grains for animal units. Technological innovations for genetic improvements that increase yields and improve input efficiency measured in terms of cost of inputs/unit of output have been dramatic over the past 50 years and show no signs of slowing. At the same time, consumer concerns about food safety and increased preferences for greater information about and choice of the production technologies employed in food production likewise seem to have great and perhaps increasing momentum. The impacts of these types of movements are unclear but tend not to result in less spending on food in total. Emerging technologies related to remote sensing, improved input usage, and monitoring of demand and supply channels favor scale of production, which in turn tends to favor greater investment and more separation between ownership and operation of assets. In short, most long-term factors will tend to promote broader access to equity investments in agriculture and the further financialization of the sector.

Conclusion

Farmland has been a remarkably well-performing asset but historically somewhat outside the commonly considered space of investable assets. As markets continue to mature and the ability to transact in this sector improves, it is increasingly important to consider the potential role of farmland investments in pension fund and other institutional investment portfolios. ■

Bruce J. Sherrick holds the Fruin Professorship in Farmland Economics and is Director of the TIAA Center for Farmland Research in the Department of Agricultural and Consumer Economics at the University of Illinois.

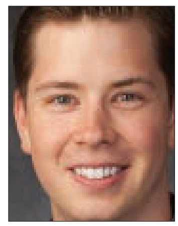


The Renewable Energy Sector:

A Discussion of the Major Contributors to Renewable Energy Growth

Institutional Interest in **Renewable Energy**

Institutional investors have been active in the renewable energy space since the mid-2000s, attracted by the potential role renewable energy could play in mitigating the impacts of climate change. Over the past decade, government policies in North America, Western Europe, and key Asian countries have actively encouraged the expansion of renewable power generation through a range of public policy initiatives, including investment credits, feed-in tariffs, preferential pricing, and targeted reductions in fossil fuel power generation. Private investors in the renewable energy space responded to these changing energy markets, and Preqin found that as of April 2017, half of private equity capital fund-raising in the energy space was targeted at renewables, while 40% was allocated to traditional energy sources. Recently, Black Rock closed a $1.65 billion renewable energy fund, targeting an allocation of 85% for solar and the remainder in wind power.

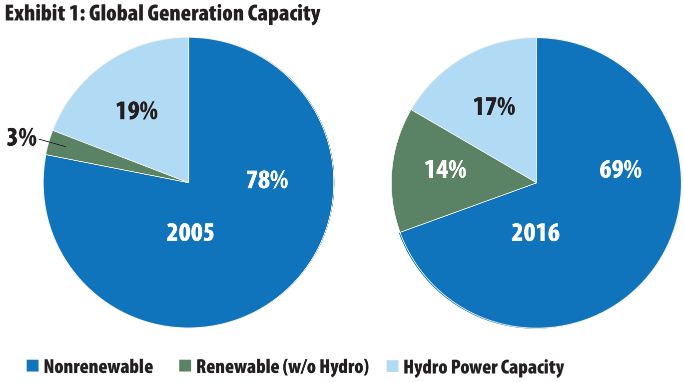


Keith Goplerud
Hancock Natural
Resource Group

Growth of the Sector

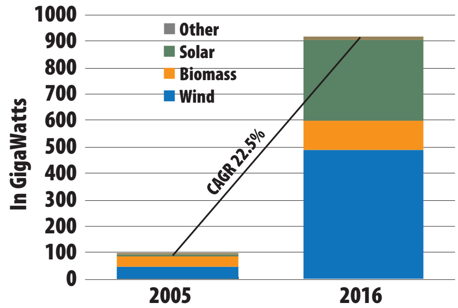
The renewable energy sector generally refers to electric power generated from sustainable natural sources, including hydro, solar, wind, biomass, geothermal, and tidal. Hydro remains the largest subsector of renewable energy and represented 17% of global power generation in 2016 but has experienced slow growth and lost share to other renewables (Exhibit 1). Hydro power projects have faced challenging economics and environ-

Exhibit 1: Global Generation Capacity



Source: *Renewables 2017 Global Status Report,* REN21

Exhibit 2: Global Generation Capacity by Sector



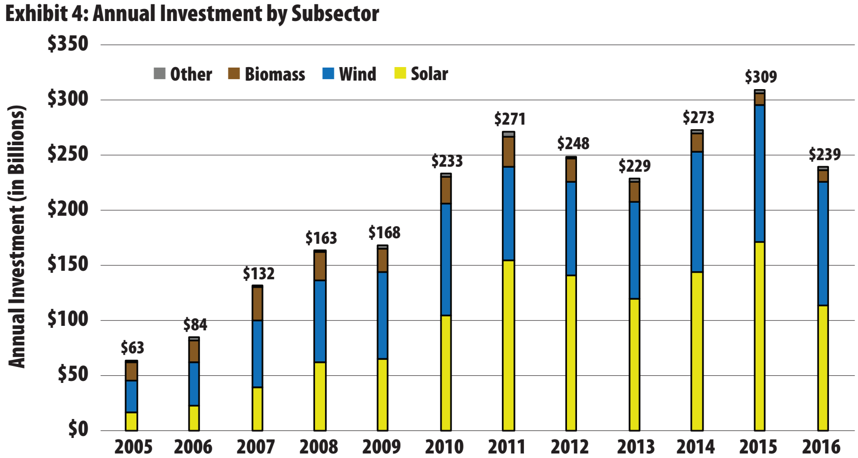
Source: *Renewables 2017 Global Status Report,* REN21

Exhibit 3: Countries With the Largest Renewable Energy Capacity

	Annualized Growth 2005–2016
Japan	**22%**
India	**19%**
China	**18%**
US	**18%**
Germany	**14%**

Source: *Renewables 2017 Global Status Report,* REN21

Exhibit 4: Annual Investment by Subsector



Source: *Renewables 2017 Global Status Report,* REN21

mental roadblocks that have limited investment over the past decade. In this article, "renewable power" refers to sources excluding hydro. In 2005, there was 113 gigawatts (GW) of installed renewable capacity, representing less than 3% of global capacity. By the end of 2016, renewable energy power generating capacity swelled to 920 GW and represented 14% globally. Of this total, wind was the largest component, at 487 GW, followed by solar (308 GW) and biomass (112 GW). The remaining renewable power sources, geothermal and tidal action, represented less than 2% of the renewable sector. Between 2005 and 2016, renewable energy capacity grew at an annualized 22.5% pace (Exhibit 2), while all other energy capacity growth (of hydropower, nuclear, and fossil fuels) sustained an annualized growth rate of 3.3%. Among renewable energy sources, solar and wind power were the fastest growing; between 2005 and 2016, capacity increased at an annualized rate of 52% and 21%, respectively.

The growth in renewable power generation over the past decade has been a global phenomenon. The five countries with the largest renewable energy capacity are Japan, India, China, the US, and Germany (Exhibit 3). These five players account for 65% of worldwide installed renewable energy capacity, and all have maintained double-digit annual growth rates since 2005.

Expanded investment has fueled the growth in global renewable power generation. Annual investment in renewable power generation grew steadily from just $63 billion in 2005 to a cyclical peak of $271 billion in 2011. Since 2011, investment in renewable energy has maintained a healthy average level of more than $250 billion per year and set a new record in 2015 of $309 billion (Exhibit 4). Between 2005 and 2016, a cumulative total of $2,412 billion was invested in renewable energy globally, primarily in project financing and research, with the bulk of the investment directed to the solar ($1,150 billion) and wind ($989 billion) subsectors (Exhibit 5).

Advances and Hurdles

Growth in renewable power production is anticipated to be driven on a number of fronts: broadening commitment to reducing the carbon gas emissions associated with the use of fossil fuels (coal, natural gas, and oil), increasing cost competitiveness of renewable energy production with fossil fuel power generation, and the transition to renewable energy sources to reduce a country's dependence on imported fossil fuels.

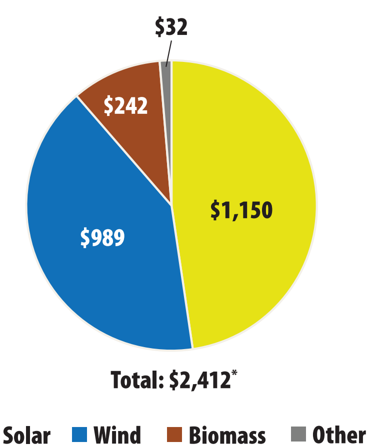
Increasing global recognition of the link between greenhouse gas emissions and climate change and a building commitment to phasing out the use of fossil fuels will support continuing investment in renewable power generation over the coming decade. Between 2005 and 2016, the number of countries with government-mandated targets for renewable power generation increased from 50 to 176. High-profile international agreements, such as the Paris Agreement, which was adopted in December 2016, have provided a road map for government policy initiatives to expand renewable power production and have been influential in building public support for reducing the use of fossil fuels for power generation. A Gallup poll in March 2015, found that 55% of Americans believed global warming was caused by human activities, and an equal percentage thought its impacts had already begun; two years later, the same poll recorded increases to 68% and 62%, respectively.

Investment in renewable energy also offers countries that depend on imported fuels a possible path to energy independence.

The substantial growth in the renewable power sector over the past decade has been accompanied by technological advances that have driven the costs of renewable energy lower and made solar, wind, and biomass energy more competitive with traditional fossil fuel power and less dependent on government subsidies and mandates. The cost savings associated with the improved technologies have been amplified as production of new equipment has ramped up, allowing manufacturers to achieve economies of scale. Since 2010, the global average cost to generate a kW of solar power has dropped 65%, and the global average price for wind power has fallen 18%. The increasingly cost-competitive position of solar energy compared to traditional fuel sources, coupled with its ability to provide electricity to otherwise off-grid populations, has pushed emerging economies to become key growth regions for investment in renewable energy. For the second year in a row, emerging economies invested more in solar power technology ($57.5 billion) than did developed economies ($56.2 billion).

Investment in renewable energy also offers countries that depend on imported fuels a possible path to energy independence. Uruguay's experience is a clear illustration of renewable power's potential to reduce a country's exposure to imported fuel. In 2000, foreign oil represented more than 25% of Uruguay's total imports, prompting the government to invest heavily in renewable energy; Uruguay's rate of investment in renewable energy reached 15% of annual GDP in 2014. By 2016, Uruguay generated over half its total energy mix and more than 95% of its electricity from renewable sources, reduced oil imports by half, and is now exporting wind-powered energy to countries from which it previously imported oil and gas. The Baltic region (Estonia, Latvia, and Lithuania) is currently pursuing a similar move away from energy dependence. Currently, the region's energy supply is dominated by Russian natural gas imported via gas lines constructed prior to the collapse of the Soviet Union. Along with building the capability to access liquid natural gas shipments and expanding power lines to Eastern Europe, the region is also increasing investment in its now-small renewable energy sector. Estonia's investment in the space last year, for example, exceeded its combined investment totals in 2013, 2014, and 2015. In 2016, Lithuania's wind power capacity rose by 56%, spurring electricity production from renewable sources to surpass that from non-renewable sources for the first time in the country's history.

Exhibit 5: Cumulative Global Investment (in Billions) 2005–2016



Source: *Renewables 2017 Global Status Report,* REN21
* The total of each bar in Exhibit 4, representing annual incremental investment.

Exhibit 6: Top Regions/Countries in Renewable Energy Electric Power Capacity (in GW)

	Global	China	United States	Germany	Japan	India	Italy
Biomass	112	12	17	8	4	8	4
Solar*	308	77	43	41	43	9	19
Wind	487	169	82	50	3	29	9
Other†	14	0	4	0	1	0	1
Total	921	258	145	99	51	47	34

Sources: *Renewables 2017 Global Status Report,* REN21
*Solar Includes photovoltaic and concentrating solar power.
†Other includes ocean and geothermal power.

Recent Developments

Solar

Capacity growth has grown most quickly in solar power compared to other renewable sources; by the end of 2016, 164 large-scale (> 50 MW) solar plants operated around the world, a significant increase from 124 plants at the end of 2015. In 2016, solar power generation capacity increased by 75 GW, a record in annual capacity additions. China, the US, and Japan experienced the most growth, with additions of 34.5 GW, 14.8 GW, and 8.6 GW, respectively. These three countries accounted for 85% of global solar capacity additions in 2016 and now account for more than 50% of global solar capacity (Exhibit 6). The cost of solar continues to fall; between 4Q2015 and 4Q2016, the average price to produce a watt of solar-generated energy fell 29%.

Wind

In 2016, wind power generation also continued to expand at a healthy pace, as capacity increased by 55 GW, with the bulk of the additions in China (23.4 GW), followed by the US (8.2 GW) and Germany (5.0 GW). The rapid growth in wind power generation in China slowed in 2016 because of transmission and grid integration challenges. Chinese wind capacity is concentrated in its northern regions, far from major metropolitan areas, resulting in inefficiencies. In 2016, 17% of generated wind power was lost as a result of insufficient infrastructure. As a comparison, the US's 8.2 GW of wind power capacity is just 48% of China's 169 GW, but the US generated 227 terawatt hours of electricity over 2016, which was 94% of the wind power–generated electricity produced in China.

Biomass

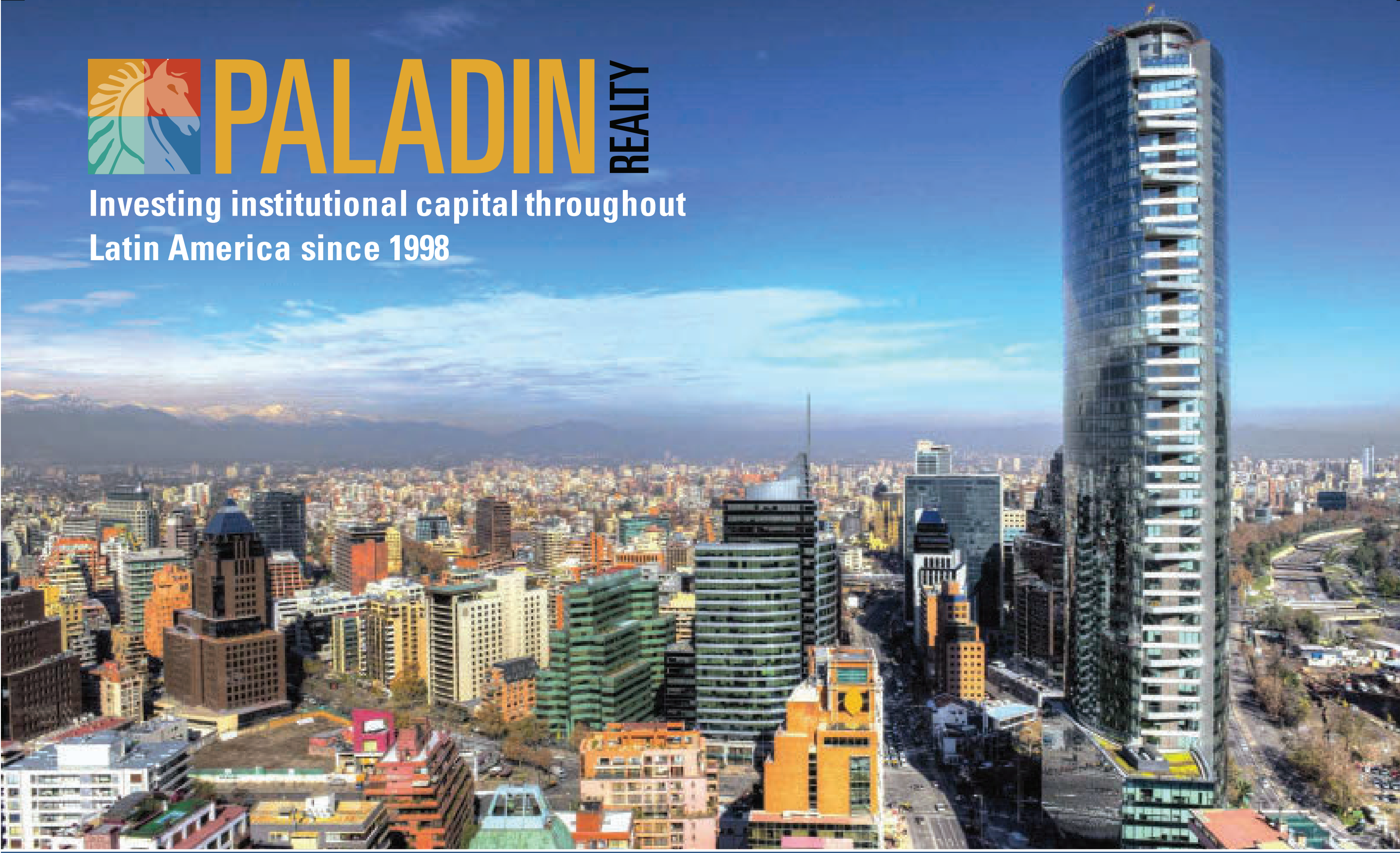
Growth in biomass power generation has been more subdued than growth of solar and wind, with capacity expanding at a more moderate 9.6% rate between 2005 and 2016, compared to 21.2% for wind and 51.7% for solar. Investment in biomass has waned from a peak of $20 billion in 2011 to $7 billion in both 2015 and 2016, but biomass power generation is anticipated to remain an important and necessary component of the overall shift to renewable energy. Both solar and wind power contend with intermittency and storage issues; power can be generated only when the sun is shining or the wind is blowing. Biomass power can be used in conjunction with solar and/or wind to meet base-load demand and modulate surges and slumps in overall power demand. Biomass pellets can be substituted for coal in existing power plants with very limited capital investment, providing in some cases a relatively low-cost option for meeting renewable energy targets.

Challenges and Prospects

Renewable energy is beginning to confront a number of hurdles that could moderate future growth. Some of the most advantageous sites for solar and wind were the first to be developed, and potential sites for new facilities are less productive and farther from major energy demand centers. In addition, advances in energy storage technology have not kept pace with the rapid growth in solar and wind power generation. Neither solar nor wind power can continuously produce power if weather conditions are not suitable. Advanced batteries could remedy this problem, but currently, the technology to effectively store solar- and wind-generated electricity is not available. The progress of renewable energy will also face choppy waters resulting from the ebbs and flows of policy momentum in individual countries, such as the US withdrawal from the Paris Agreement and rollback of the Clean Power Plan, both announced by President Donald Trump last summer.

Despite ongoing political debate, investment in the renewable energy space continues to move forward, with the US adding more than 2 GW of solar capacity in the first quarter of 2017. In a recent survey of energy experts, 71% stated that a transition to 100% renewable global energy is a feasible goal over the long term, though continuing problems in storage and transportation will remain its most significant hurdles. Roughly half of scientists believed that renewable energy will make up more than 60% of final energy consumption by 2050, more than twice the share it contributes today. Bloomberg New Energy Finance forecast that $2.8 trillion worth of clean energy investment will enter the space over the next ten years, including technology development, public and private market investment, and asset financing, with 75% of this investment expected to target wind and solar power. ■

Keith Goplerud is an Economic Research Analyst at Hancock Natural Resource Group.



Why Latin America?

Demographics

- Young populations entering the workforce fueling rising prosperity
- Growing middle class stimulating demand for modern real estate
- Household formation greatly exceeding new supply

Scale

- Population of 420 million in Brazil, Mexico, Colombia, Peru and Chile – a larger market than the U.S.
- Housing deficit exceeds 15 million units

Superior Economics

- Higher projected profit margins compared to developed markets
- Target opportunistic returns with relatively low leverage
- Provides downside protection to preserve invested capital and returns

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Evan Pickering, Vice President - Investor Relations
USA +310.996.8755 ▪ epickering@paladinrp.com

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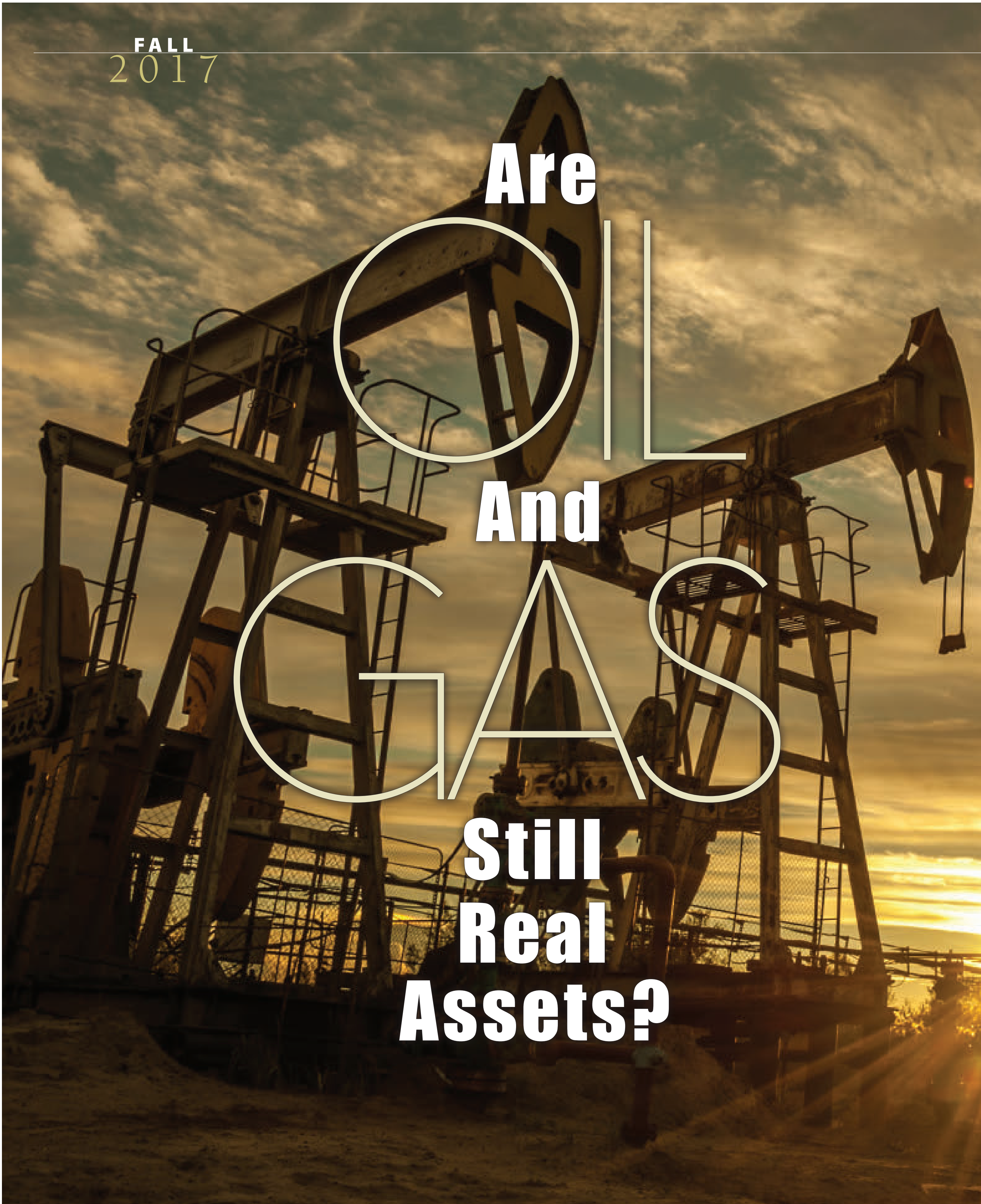
Are OIL And GAS Still Real Assets?

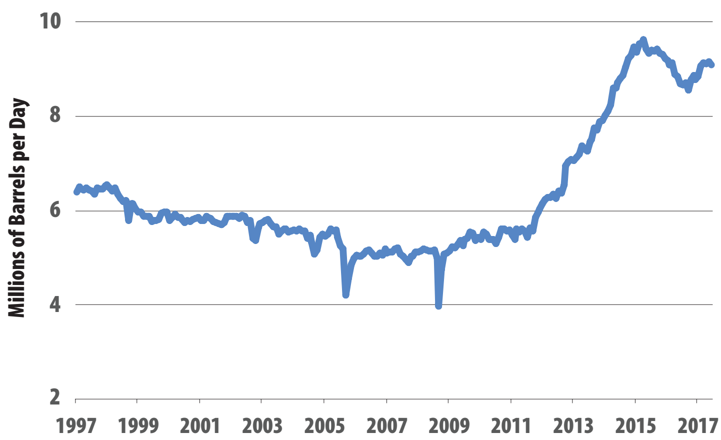


For years, oil and gas investing through private equity funds was considered, by some institutional investors, a real asset strategy.

At many institutions, professionals with the title of "real asset" investor had whiplashing duties of analyzing an upstream oil investment on Tuesday, a timber investment on Wednesday, and a commercial real estate development on Thursday. What held these tasks together, loosely, was not any similarity in investment drivers but rather a similarity in investment return profiles: all real assets were supposed to have elements of inflation protection, long-term downside protection (as in any economy, an investor still owned a building, a cornfield, or oil), and in many cases—the best cases—scarcity value, income generation, and the ability to prudently leverage those assets.

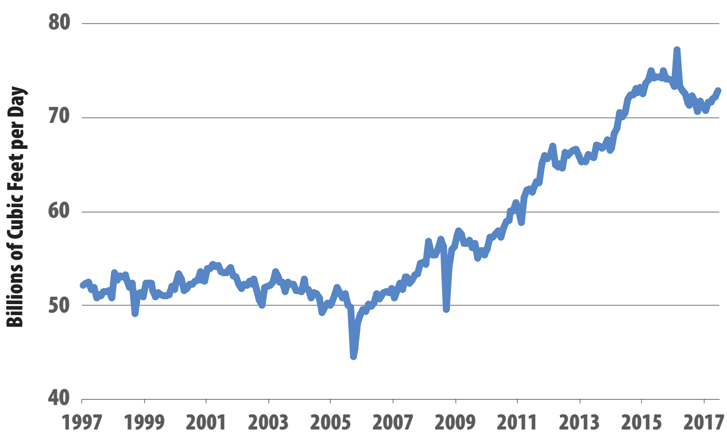
Gary Sernovitz
Lime Rock Partners

Exhibit 1: US Crude Oil Production, 1997–2017 Year to Date



Source: Energy Information Administration

Exhibit 2: US Marketed Dry Gas Production, 1997–2017 Year to Date



Source: Energy Information Administration

For decades, the real asset categorization for oil and gas seemed sensible. Something even better started in 2002: for investors, oil and gas investments combined all the "safety" features of real assets with the growth characteristics of an industry in acceleration mode, driven largely by demand from China and other emerging markets. Safe oil and gas prices were actually steadily going up. Investors got to keep their cake and eat it too. But with the decline in natural gas prices starting in 2008 (felled by the global financial crisis and still down a decade later) and oil prices starting in 2014, the opposite seems to have happened: many oil and gas assets have not held their value, and equity in them feels anything but real. At the root of the decline in prices is the US shale revolution, an unforeseen (and in some ways unimaginable) change to the global oil and gas business. Amid all the other changes wrought by the revolution, a key question to ask is, Are oil and gas still real assets?

The Shale Revolution

Much ink has been spilled on the US shale revolution (including an entire book by this author). It is hard to overstate the impact of advances in horizontal drilling and hydraulic fracturing, when applied to US oil and gas shale reservoirs, on the global environment, local communities in shale areas, the US economy, US foreign policy, global energy consumption patterns, and the oil and gas industry itself. The near-term impacts of the shale revolution have related to its impressive volumes: from nowhere, US shale gas now accounts for about half of US supply, and US shale oil now supplies about 5% of the world's consumption. (Exhibits 1 and 2 display US crude oil and dry gas production over the past 20 years.) In the case of oil, the new unexpected source of supply collided with the 2014 decision by Saudi Arabia to try to protect market share. While that decision was subsequently reversed, both oil and US natural gas prices remain at effectively half their "pre-shale" prices in markets that are more than adequately supplied.

Yet when thinking about the shale revolution in the context of long-term thinking about oil and gas as real assets, the revolution is important for another reason. For the first time in the modern history of the oil business, a new large source of supply came to the market at a lower breakeven cost than prior new sources of supply and a considerable amount of legacy supply. That is, the shale revolution is not a one-time disruptive force in the oil and gas business but an ongoing force of disruption that undermines many prior truisms of oil and gas assets: a Malthusian "peak oil" vision of scarcity in which demand will eventually outstrip reasonably priced supply and a qualitative "resource pyramid" view that new supply will always grow ever more expensive.

No, Oil and Gas Are Not Real Assets

Because of the shale revolution, good arguments can be made that oil and gas investments are not real assets anymore. An oil field used to be like a building in Manhattan because there was a fixed amount of supply, and costs weren't getting any cheaper. But in an era when technology "creates" a new cheap supply, that analogy no longer holds. Investors who bought oil and gas investments as "inflation protection" and worried about a reprise of 1970s oil shortages learned a hard lesson in the past ten years. There was little general inflation to be protected from, and oil and gas prices declined because of industry-specific *deflationary* forces.

There is a group of private equity energy investors who invest in oil and gas less on a real assets model than something more akin to a growth capital model in industries regularly buffeted by secular changes, such as technology and retail. The guiding principles for investors with this growth mind-set are threefold:

- Focus on the disrupting sources of new supply (from new drilling) rather than legacy fixed supply at old cost structures (from production)
- Be extremely cognizant of the cost of supply of exposed assets, given the lower trajectory for oil and gas prices and the risk of periodic very low prices
- Look for businesses that can achieve corporate growth outside the "commodity play" of owning oil and gas resources, such as differentiated oil field service companies that service the shale fields, fast-growing exploration and production strategies that can grow reserves and production, and midstream strategies.

Yes, Oil and Gas Are Still Real Assets

Oil and gas investing is not completely akin to technology investing. An oil field may no longer be a Manhattan office building; it's also not a smartphone. Even with the momentous changes wrought by the shale revolution, there are oil and gas assets that still retain essential features of real asset investing, and managers are pursuing these assets. The features of such investments, of directly owning oil and gas fields, include these:

- Current income from the production of oil and gas (an oil or a gas field, produced over years, is like a building whose tenants and their checks are already in place and underground)
- Current income protection from the use of liquid hedging markets, especially in the near-term
- Noncorrelation with other markets, with oil and gas prices driven as much by industry supply as the general economic growth (and with looser connections to broad public equity markets)
- Permanence to the ownership of a physical asset, however variable its value
- The potential use of leverage to enhance returns because lenders can hold a lien against that physical asset

These real asset features can be attractive, if the assets are bought in prudent ways and operated by skilled managers. Yet the returns on real assets cannot totally escape the direction of oil and gas prices during the holding period; one can hedge only so much revenue in an oil and gas field that may produce its hydrocarbons for 30 or more years, so investors must have some directional call on oil and gas over the next decade. Will prices halve again? Will they revert to the mean of $100 per barrel and $6 per thousand cubic feet? Will they incline slowly or stagnate?

Any investor answering those questions should bring the appropriate humility. Few investors, including this one, have good track records of predicting commodity prices consistently because of the thousands of variables that set those prices.

But markets still have shapes and facts. As far as US natural gas, some recovery in gas prices seems likely only if there is an unexpected acceleration in the pace of domestic demand growth and exports.

Recent history has shown the limits to oil prices' remaining far below today's prices for extended periods. In the $30 to $40 per barrel range, US shale producers pressed hard on the brake for drilling, causing a quick decline in production. State producers in OPEC and other countries agreed to restrict production, to protect the oil export revenue they need for their regimes to survive. And although the upside of oil prices will be limited by the growth of shale production, the 25- to 50-year transition to mass electrification of transportation, and a general increase in energy efficiency, oil prices in the medium term will be helped by service costs coming off the bottom, a strengthening global economy, and the relative size of US shale production in a global market. At some point, assuming oil demand grows, other sources of oil supply besides shale will be needed to replace 96 million barrels per day of existing production from fields that all naturally decline. The rules will resume in some areas: the world will use worse resources with higher costs. But it's a bold investor who will try to predict the month, or even the year, of that inflection point.

And in Both Cases …

Finally, for private equity investors who see oil and gas investing in either a new paradigm or an adjusted real asset paradigm, similar criteria should probably be followed in both cases. There have been and are likely to continue to be wide performance dispersions across managers in both strategies. Investors should ask these questions:

- Does the manager have a clear strategy and understand the difference between growth assets and more income-oriented "real" assets?
- Does the manager have a history of correctly valuing assets and companies, given the added complexities of investing in an industry that sells commodities in a disrupted market?
- Does the manager have the right attitude toward (and history with) leverage?
- Does the manager have the right cost structure to its funds, considering the underlying returns available from the different strategies?
- Does the manager have access to differentiated opportunities in a market with multiple participants active at every conceivable deal size and strategy?
- Do portfolio company management teams or, in direct operator strategies, the managers have the skills to drive operational growth?

A pessimistic view of the change in the private oil and gas market is that investing used to be much easier. Investment rules, based on physical principles, applied. They protected returns to some degree. Then the shale revolution scrambled those rules and dampened, for a period, private equity returns. (The returns on the shares for many public oil and gas-related companies were less dampened than destroyed.) But the optimistic view of the shale revolution is that it has broadened the investment universe in oil and gas. Carefully, one can still look for managers providing income and downside protection, presuming at worst a benign commodity price environment. And one has a second set of options: investing with companies that are part of "Shale 2.0"—new producers and oil field service innovators that are driving one of the most unexpected changes in American industrial history, changes still unfolding that have strengthened America's economy, its power, and its opportunities. ■

Gary Sernovitz is a Managing Director at Lime Rock Partners.

This announcement appears as a matter of record only.
September 2017

DivcoWest Fund V

$1,585,000,888

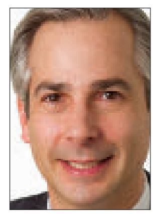
DivcoWest Fund V has been formed by
Divco West Real Estate Services, LLC
to acquire commercial properties in
innovation markets throughout the U.S.

**Greenhill & Co., LLC acted as
global capital advisor.**

Greenhill

The Growth of Investable Infrastructure As an Asset Class

Infrastructure has grown substantially as an asset class over the past 15 years, having gone from being specialist or niche to becoming its own independent asset class and a viable asset allocation option for investors without an exposure to real assets. ■ Infrastructure's growth has been driven largely by two factors. The first is governments' growing desire that the private sector own these assets both to improve their efficiency and to free up government revenue for other areas of spending. The second is the strong growth in pension funds over this period, which has in turn fueled demand for long-dated assets that deliver reliable cash flows. ■ While there is no precise definition of what constitutes investable infrastructure, infrastructure assets provide services or facilities essential to modern economies and urban societies, and they typically have high initial capital costs, long useful lives, and high barriers to entry. They also have stable, predictable cash flows and revenues that are often directly linked to inflation.



Andrew Dietz
Macquarie Infrastructure and Real Assets

Daniel McCormack
Macquarie Infrastructure and Real Assets

The Investment Case for Infrastructure

Infrastructure's growing popularity among investors has been driven by three factors:

- **Overall returns,** particularly risk-adjusted returns, are attractive relative to traditional asset classes such as equities and bonds.
- Infrastructure returns have certain **traits or characteristics** that investors find appealing. For example, infrastructure is an effective hedge against inflation and offers downside protection in bad economic times.
- There are significant **portfolio benefits** of adding infrastructure to an already existing portfolio of equities and bonds.

According to Cambridge Associates, since 2004 (as far back as there is data) unlisted infrastructure has delivered an annualized compound return of 9.1%. Over the same period, equities have delivered 6.1% and bonds 3.5%. The volatility of unlisted infrastructure's returns has been significantly less than that of equities and slightly more than the volatility of bonds, making its risk-adjusted return performance very impressive indeed.

The profile of infrastructure's returns is also something that appeals to investors. For example, investing in infrastructure offers an effective hedge against inflation. When inflation is elevated, infrastructure significantly outperforms both equities (by 3.6 percentage points [ppt] per year) and bonds (by 8.1 ppts per year). Relative to equities, infrastructure also offers downside protection in weak economic times. When growth is very weak, unlisted infrastructure tends to perform better by 10.8 ppts per year. Put simply: when growth is strong, infrastructure goes stride for stride with equities, but when growth is very weak, infrastructure generally outpaces equities. This outperformance in periods of economic weakness is in the main because of the relative resilience of consumer spending on the essential services that infrastructure provides.

Finally, adding infrastructure to a traditional portfolio of equities and bonds materially improves that portfolio's performance. Adding a 20% allocation to infrastructure to a portfolio that is 60% equities and 40% bonds (lowering each by 10 ppts to accommodate the new allocation) both increases the average return of that portfolio and lowers its volatility, pushing out that portfolio's efficient frontier.

The Public Policy Case for Infrastructure

The US and other countries around the world have a clear need to reinvest in critical existing infrastructure, to build new infrastructure, and to bring existing infrastructure into the next century. For governments, the case for investing in infrastructure is powerful. First, it generates significant employment gains for each dollar spent, meaning it provides powerful second-round effects on the economy and so is a cost-effective way to boost the economy. Second, and perhaps even more important, it increases productivity (by lowering costs, increasing options for consumers and businesses, and improving the allocation of resources across an economy)—something that increases long-run economic growth and raises living standards. Finally, as we move into a period of rapid technological change, high-quality infrastructure will be an important factor in enabling economies to adjust rapidly and therefore reap the economic benefits of these technological advancements.

The case for adding an allocation to infrastructure is compelling—returns are strong, it provides downside cyclical protection, and it likely improves an existing portfolio's risk-return profile.

As the world ages and private pension funds and systems proliferate, the amount of money chasing infrastructure assets is likely to grow. This is good news for governments. With effective policy arrangements in place, governments can harness this strong private sector demand for infrastructure to improve the quality of infrastructure networks and advance living standards for citizens. ■

Andrew Dietz is a Managing Director and Daniel McCormack is a Senior Vice President at Macquarie Infrastructure and Real Assets.

Digital Infrastructure—Connected

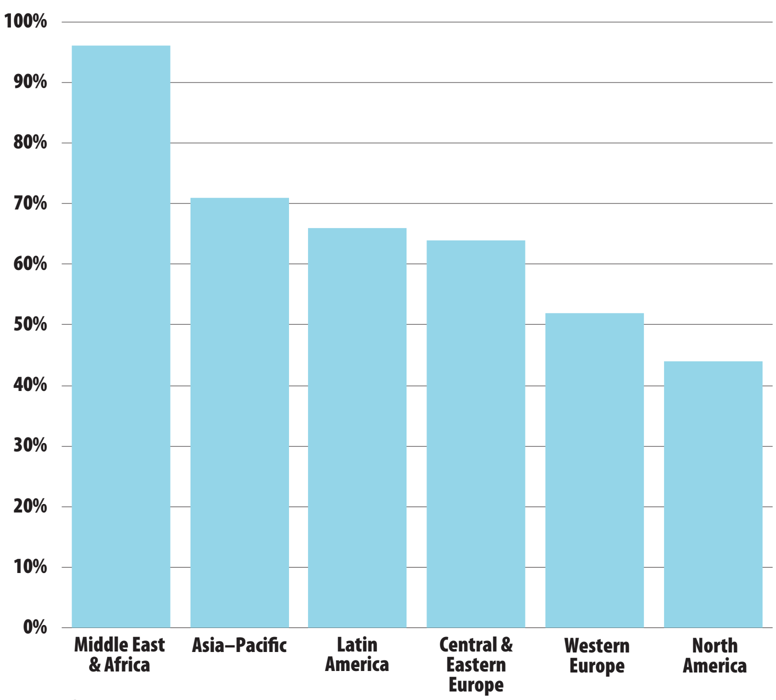
Dave Lowery
AXA Investment Managers—Real Assets

Technology continues to transform the world. It touches every aspect of business, culture, and personal lives and changes the way people work, live, and interact with one another. New technologies, ranging from artificial intelligence, autonomous vehicles, and the Internet of Things to virtual reality, are continually advancing.

New technology is being rolled out to provide the infrastructure that businesses and consumers rely upon and is connecting sectors within the digital infrastructure space more than ever. As a result, entry points into the digital infrastructure space should be assessed as a whole, rather than viewing each sector and subsector in isolation.

Digital infrastructure firms, such as telecom companies, are developing new technologies that enable people to maintain connections and continue to use technology no matter where they are in the world. Perhaps surprising to some, average mobile data speeds in Kenya, Egypt, and Indonesia are faster than those in the US.[1] Although these countries do not have the same type of established infrastructure as the US has, sometimes existing technology and legacy infrastructure networks can slow development rather than speed it up.

Exhibit 1: 2016 Mobile Data Traffic Growth



Source: Cisco
Notes: Data are as of February 2017.

The lack of established fixed-line networks in many regions has spurred strong growth in mobile data traffic. According to Cisco, mobile data traffic growth reached 96% in the Middle East and Africa during 2016, compared to 44% in North America. While growth in North America and Europe was lower than that in all other regions, as can be seen in Exhibit 1, it remained strong.

Infrastructure Providers Responding to Changing Needs

Mobile network operators and other digital infrastructure providers have shifted the ways they deliver their services in response to how the public and businesses consume data. Traditional telecom masts remain a feature but have been supplemented with new technology, such as small cells and distributed antenna systems (DAS). As many mobile network operators confront spectrum limitations following a period of relatively flat capital expenditure[2] while demand growth rises, network densification is the primary tool used to increase capacity. This entails conventional cell splitting (deploying a new cell site in a capacity-constrained area in order to accommodate increased traffic), deployment of higher-speed links (often by deploying fiber to the cell site), and various small-cell approaches such as microcells, picocells, and femtocells. Because of their small size, these devices are often more feasible from a zoning perspective. They can also be more effective than conventional macro cell sites at addressing pinpoint capacity needs. In practice, this means that a person walking down the street will not lose wireless connection while streaming a music service or live news feed, for example.

Outdoor DAS installations can be used in a range of settings, including downtown areas, historical districts, difficult-to-zone neighborhoods and travel corridors, or where obtaining zoning approval for a conventional tower is difficult. Because DAS elements are positioned as individual nodes on low-elevation structures, rather than as highly visible arrays (as on towers), zoning authorities that are resistant to towers are often more amenable to DAS. As a result, in some metro areas, obtaining construction approval for DAS installations is easy. The fact that these installations now frequently link directly to fiber

1. Rani Molla, "The U.S. Ranks 29th in the World in Mobile Internet Speeds," *Recode*, June 7, 2017.
2. Global wireless capex was estimated at $31.4 billion in 2014 and is estimated to reach $31.7 billion in 2017, according to Royal Bank of Canada estimates.


PERFORMANCE.
The pursuit of world-class performance requires intense focus. For more than 40 years, we have been solely focused on real assets as part of the world's largest real estate platform. Through our deep, global experience, we have learned that performance is achievable through constant innovation, active management and understanding the risks ahead. But above all, we believe performance is achieved by putting the investor first.
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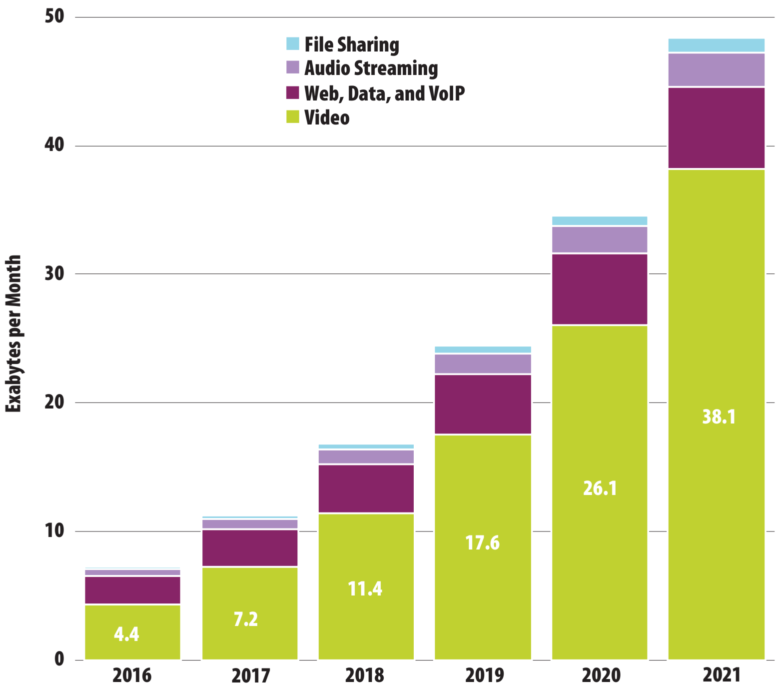
LISTED SECURITIES
PRIVATE INFRASTRUCTURE

Exhibit 2: Video Set to Be the Main Driver of Mobile Traffic Growth



Source: Cisco
Note: Data are as of February 2017.

networks to increase capacity highlights the links between one subsector and the other.

Edge data center network growth has been driven by providing data connectivity directly in locations it is most needed. These networks can be considerably smaller than the average data center and located in smaller population centers that are farther from traditional hubs, yet they still require a reasonable amount of bandwidth to allow viewing of mobile and Internet video. This form of data consumption, which dominates data use now, looks set to drive data growth in the future, as can be seen in Exhibit 2.

Fiber: Still the Backbone of Many Networks

Despite the growing importance of mobile, fiber infrastructure plays a key role in delivering mission-critical communications services. Following aggressive construction, many fiber companies struggled in the early 2000s because of a lack of demand, business failures in the carrier and Internet sectors, and overcapacity.[3]

In the mid-2000s, a substantial expansion in computing power and growth in bandwidth-intensive applications drove meaningful traffic growth, which led to a recovery in demand for fiber networks. The capacity and performance of the consumer last-mile connection was primarily addressed by the expansion of cable and telecom networks and through mobile network development by wireless carriers.

Meanwhile, the growing bandwidth business users demanded was provided by a number of focused fiber developers constructing new networks to connect directly to data centers, government facilities, schools, hospitals, and other locations with high-bandwidth needs.

Not All Fiber Is the Same

"Dark fiber" provides raw bandwidth infrastructure to customers who desire more control over their networks. From a customer perspective, dark fiber contracts are typically long term (5 to 20 years or longer) and tend to feature low churn, while entailing high capital investment. Under these arrangements, customers lease fiber strands and light them with their own optical equipment.

"Lit services" are based on carrier-owned fiber and optronics. Customers pay based on the amount and type of bandwidth service they purchase, with services including wavelength, Ethernet, Internet Protocol, and Synchronous Optical Networking services. Contracts are typically shorter than those for dark fiber, generally running between two and five years.

What Is Needed: More Fiber or Better Connections?

A fiber optic cable has a single glass core through which information travels. However, research conducted by Dutch and American scientists in 2014 in multi-core technology (a cable has several glass cores through which information travels rather than just one) revealed that the current use of available fiber is just a fraction of its true capability. The scientists achieved a top speed of 255 terabits per second. To put this into context, it equates to downloading a 4 GB high-definition film in just 0.12 seconds.[4]

The conclusion of this research was that a single fiber cable could theoretically carry the entire world's Internet traffic, according to infrastructure services company Zayo. Although this research highlights the fact that more bandwidth is not needed per se, significantly improved connection between existing networks could result in much greater speeds. In practice, making global improvements would be difficult, considering that 95% of the world's Internet traffic and around $10 trillion of daily global financial transactions[5] are carried over more than 300 subsea cables.[6] Satellites account for the remaining 5% of global Internet traffic.

The disparate ownership of subsea cables also creates potential barriers to their efficiency. The termination points of subsea cables are often controlled by telecom operators, which then provide transport options to other networks. As a result, third-party data center operators, even those with locations close to cable landing stations, have traditionally been unable to obtain direct network access. Exceptions include circumstances in which data center operators' network customers have provided direct access or in a site where a telecom sponsor is not an incumbent player at the location. These potential connection issues have prompted organizations to lay their own subsea cables, with joint Facebook-Microsoft[7] and Facebook-Google cables examples of collaboration between major infrastructure providers.[8]

Connected Digital Infrastructure Is Leading to a Shift In the Way Some Companies Operate

Many companies are now beginning to provide dark fiber services alongside both traditional and more specialized telecom services. Further, some operators are also moving into the data center space in order to offer a full suite of digital infrastructure services. One example of such a shift in strategy is that of Crown Castle International, which has added DAS and small cells to its network of traditional towers. It has also added significant fiber capacity and acquired its first colocation data centers during 2017.[9]

This strategy of ensuring a company can offer a variety of services to its clients could create a seamless ecosystem of connectivity for a range of clients and end users. Such a company could then exercise significant control over the connected ecosystem, potentially delivering an enhanced service for users.

Ultimately, telecoms and digital infrastructure providers are responding to the ongoing shift in the way both businesses and the public consume and generate data. Those that control their entire networks are likely to have a significant advantage over those that remain niche operators or fail to see the increasing connectivity between the various digital infrastructure sectors. ■

Dave Lowery is Senior Research Analyst at AXA Investment Managers–Real Assets.

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4. Sebastian Anthony, "255Tbps: World's Fastest Network Could Carry All of the Internet's Traffic on a Single Fiber," *Extremetech*, October 7, 2014.
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8. Klint Finley, "Facebook and Google Will Stretch Internet Cable from LA to Hong Kong," *Wired*, October, 12, 2016.
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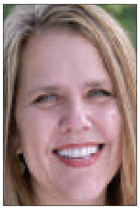
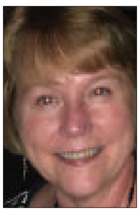
NCREIF PREA Reporting Standards: Increasing Focus on Closed-End Funds



Jamie Kingsley
Kingsley Consulting



Marybeth Kronenwetter
NCREIF

The mission of the NCREIF PREA Reporting Standards is to establish, manage, and promote transparent and consistent reporting standards for the real estate industry to facilitate informed investment decision making. The Reporting Standards were established to address a perceived gap and inconsistency in reporting practices for investors in real estate investment vehicles. Reporting Standards for open-end funds have been successfully established (with 95% compliance in the industry), and similar reporting requirements are in the process of being finalized for closed-end funds, which have several unique considerations to address.

The Reporting Standards contain required and recommended elements for reporting to investors. The required elements are considered a minimum baseline for reporting, but funds are encouraged to adopt both the required and the recommended Standards, which would represent best practices within the industry. Many of the required and recommended elements apply to all investment structures. For example, fair value reporting, quarterly valuations, financial risk measures, and certain types of diversification characteristics can be consistently and meaningfully compared across all investment structures. The Standards also can reflect investment structure; open-end funds, closed-end funds, and single client (separate) accounts all have specific components within the Standards tailored to their defining structural characteristics. For example, equity multiples are appropriate performance measures for closed-end funds but not for open-end funds.

The Reporting Standards have been readily embraced by the open-end fund community as evidenced by a 2014 study[1] with over 95% compliance for funds reported to the NCREIF Fund Index—Open End Diversified Core Equity (NFI-ODCE). The challenge now facing the Reporting Standards Board and Council is to build similar success with managers of other investment structures, notably closed-end funds. The NCREIF Fund Index—Closed End Value Add (NFI-CEVA) is the only known index of its kind and is building and expanding to become more widely accepted as a benchmark for closed-end value add funds. NCREIF is working closely with the Reporting Standards Board and Council to encourage standards compliance among NFI-CEVA contributors.

Similarly, work has commenced on several topics that need to be tackled to address the specific reporting demands of the closed-end community. Such projects have generated substantial momentum within the Reporting Standards Board and Council, with enthusiastic discussions covering several meetings, energizing members of the sponsor organizations, and bringing critical issues to the table for resolution. The result will be improvements to the Reporting Standards overall. The Reporting Standards Board aims to capitalize on this momentum with a focus on expanding the adoption of the Reporting Standards in order to improve the transparency and consistency of reporting across open- and closed-end funds. The success of the strategy is dependent on collaboration with sponsors NCREIF and PREA, continued compliance efforts with the Reporting Standards, the establishment of prudent alliances with related industry association efforts, and increased promotion within the real estate industry.

Three projects are currently under way within the Reporting Standards to address the unique nature of closed-end funds. Successful completion of these projects is expected to catapult recognition of the Reporting and Standards and the ability to comply within the closed-end fund community.

Time-Weighted Returns and Annual External Appraisal Reporting

Determining the relevance and applicability of time-weighted returns and annual external appraisal requirements for closed-end funds is the first order of business. These existing Standards are rooted in the CFA Institute's Global Investment Performance Standards (GIPS) for real estate. The Reporting Standards Council and Board continue to work with members of the CFA Institute as it, too, struggles with compliance issues for firms sponsoring closed-end real estate funds. Cogent arguments exist on both sides to either keep the existing Standards or to change the Standards to be more applicable to a broader group of investment structures. For example, those in favor of keeping the time-weighted return requirement argue that the performance of other asset classes is measured on a time-weighted return basis, and as such, they are required for benchmark comparisons and aggregation

1. NCREIF PREA Reporting Standards, ODCE Compliance Assessment, June 10, 2014

purposes. Counter arguments include that performance of closed-end fund managers is IRR driven, and because of the nature of the calculation of time-weighted returns, performance prior to fund realization can be misleading and misused. These are just two examples of points considered that are not easy to resolve. The debate continues.

Late in 2017, an exposure draft specific to this topic will be made available for a 60-day industry public comment period. Industry input and feedback are critical. PREA members will be notified when the exposure draft is available for comment. The information considered by and conclusions of the Reporting Standards Board and Council will be presented in the exposure draft. Upon successful completion of the public comment period, if changes to the Reporting Standards are warranted, they will be made and adopted.

Global Fee and Expense Measure

The second project relates to the development of a comprehensive global fee and expense measure. This project illustrates the multifaceted nature of many projects within the Reporting Standards. Transparency, comparability, and consistency of calculations surrounding fees and expenses is a worldwide issue. Investors are pressured by investment boards and state regulatory bodies to control investment management fees and provide a complete accounting to the public of all the costs associated with administering institutional investment pools. Investment managers are feeling the heat from investors and the SEC, all of whom are demanding consistent and transparent fee disclosures. Associations such as the Reporting Standards sponsors, PREA and NCREIF, along with their global counterparts, INREV (European Association for Investors in Non-listed Real Estate Vehicles) and ANREV (Asian Association for Investors in Non-Listed Real Estate Vehicles), and other associations, such as the Institutional Limited Partners Association (ILPA), are collaborating on important aspects relating to this topic. The Reporting Standards Council is working with INREV and ANREV to develop vehicle metrics. The result of this work will be exposed for a 90-day industry public comment period in the fall of 2017. Upon conclusion of this project, changes will be incorporated into the Reporting Standards and INREV Guidelines to incorporate this global measure. In addition, and at the request of investors, the Reporting Standards Council is working with ILPA to accommodate real estate in its Reporting Template. Finally, discussions are under way regarding all groups coming together to accommodate investor reporting needs surrounding fees and expenses on a global basis.

Gross Versus Net IRR Presentation and Calculation

The third project is the development of guidance for the consistent presentation and calculation of gross and net IRR. The real estate industry does not have a consistent and transparent approach to the presentation, calculation, and disclosure of gross IRR and net IRR. IRR (along with various multiples) is considered the relevant performance measure in the closed-end fund community. Therefore, this lack of consistency may result in false comparisons or incorrect conclusions.

The guidance developed is expected to include a hierarchical approach (tiers), coupled with clear identification, definition, and mapping of fees and costs and will be published in Handbook Volume II. Guidance is expected to be available by year-end 2017.

Although each of these projects is critical to enhancing the applicability of the Reporting Standards to closed-end funds, real success is achieved by closed-end investors and managers embracing, advocating for, and implementing the Reporting Standards and initiatives. The Reporting Standards Board and Council continually need volunteers from the PREA membership to join the efforts. Educating the closed-end community on the benefits of compliance is critical as well. Webinars and videos will continue to be produced on a regular basis and will give the industry multiple opportunities to learn about the Reporting Standards.

The promotion of the key elements of the strategy is expected to increase the dialogue with industry stakeholders and highlight the benefits of compliance with the Reporting Standards. Such communication, will ultimately lead to more transparent and consistent reporting, culminating in the facilitation of informed decision making. ■

Jamie Kingsley is the Founder of Kingsley Consulting, and Marybeth Kronenwetter is the Director of Reporting Standards at NCREIF.

The New Partnership Audit Rules: What Tax-Exempt Partners Should Know

Paul S. Drizner
Seyfarth Shaw LLP

While it may be an overstatement to say that tax-exempt partners generally don't worry about partnership tax audits, that statement is probably not too far from the truth.[1] However, thanks to the Bipartisan Budget Act of 2015 (BBA),[2] that is going to change very soon. Effective for partnership taxable years beginning after December 31, 2017, Section 1101(c) of the BBA imposes a centralized audit regime that will replace the current audit procedures established by the Tax Equity and Fiscal Responsibility Act of 1986 (TEFRA) and the audit procedures applicable to electing large partnerships. The effect of this change will be to redirect the assessment of audit adjustments and the collection of any resulting tax from the partner level to the partnership. Although this change will impact all partners, the greatest impact may very well be felt by tax-exempt partners. This article summarizes the important changes made by the BBA and discusses steps that tax-exempt partners can take to protect against unwanted consequences of a partnership audit.

Current Law: TEFRA and Electing Large Partnerships

Under current TEFRA audit procedures, when the IRS examines a partnership, the IRS makes adjustments to "partnership items" at the partnership level. The IRS then makes corresponding adjustments to each partner's return to reflect the partner's share of adjustments of partnership items. In certain situations, the IRS is then required to conduct a separate deficiency proceeding at the partner level. Importantly, partnerships with ten or fewer direct partners are exempt from the TEFRA procedures, and if the IRS wants to audit a TEFRA-exempt partnership, it must conduct a separate examination of each partner and assess any resulting tax in a separate proceeding for each partner.

Certain partnerships with 100 or more partners may elect out of the TEFRA procedures. Such electing large partnerships (ELP) are, instead, subject to simplified reporting rules and centralized audit procedures that are in some respects similar to those enacted under the BBA.

The New Audit Rules Under the BBA

Why the Change?

In 2013, Congress recognized that the number of partnerships had grown significantly since 2002, but the number of partnership audits had not kept pace. It was thought that this was a result of, at least in part, the audit procedures under TEFRA, which are complex and time-consuming. Section

1101 of the BBA was enacted in 2015 to address this concern, and proposed regulations implementing the BBA audit procedures were released in June 2017. Effective for partnership taxable years beginning after December 31, 2017, the BBA replaces the TEFRA and ELP procedures with a centralized audit regime that will apply to all partnerships, including those that were previously exempt under TEFRA. Under the new audit rules, a partnership, and not the individual partners, will be liable for any tax, penalties, and interest due as a result of partnership-level adjustments. This is a very significant change from current law, especially for tax-exempt partners. Under TEFRA, a tax-exempt partner generally suffers no economic harm from partnership audit adjustments because the adjustments are passed through to the partners, and because of the exempt status, a tax-exempt partner would typically pay no tax as a result of the adjustments. However, because under the BBA the partnership is responsible for any tax resulting from audit adjustments, taxes collected from the partnership will reduce the value of the partnership and, correspondingly, the value of each partner's interest in the partnership.

Election Out of New Audit Rules

The new audit rules generally apply to all partnerships for taxable years beginning after December 31, 2017. However, Section 6221 of the Internal Revenue Code as revised by the BBA permits partnerships that have 100 or fewer partners and have only "eligible partners" to elect out of the new audit rules. For this purpose, eligible partners are individuals, C corporations, foreign entities that would be treated as C corporations if they were domestic, S corporations, and estates of deceased partners.

1. The discussion that follows applies to all entities that are treated as partnerships for federal tax purposes, including partnerships and limited liability companies that are taxed as partnerships. For ease of discussion, all such entities are referred to as "partnerships," and all equity owners of such entities are referred to as "partners."
2. P.L. 114-74.

Eligible partners do not include partnerships, trusts, or disregarded entities. Thus, a partnership that has a trust (including a tax-exempt trust), partnership, or disregarded entity as a partner will not be permitted to opt out of the new audit rules.

A partnership wishing to elect out of the new audit rules must do so annually on a timely filed partnership return for the taxable year to which the election relates. If a partnership elects out of the new audit rules, it will be audited under pre-TEFRA audit procedures, meaning that the IRS will separately assess tax with respect to each partner under the deficiency provisions of the Code.

Consistency

Section 6222 of the Code as revised by the BBA requires each partner to treat items of partnership income, gain, loss, deduction, and credit on its return consistently with how such items are treated on the partnership's return, unless the partner discloses any inconsistency in a statement attached to the partner's return. If a partner fails to treat a partnership item the same way the partnership treated the item, the IRS can adjust the partner's return to make it consistent with the partnership return and determine any resulting underpayment of tax. The IRS may then immediately assess and collect the tax from the partner.

Partnership Representative

Under TEFRA, a partnership is required to appoint a partner as its tax matters partner (TMP) to act as the liaison between the IRS and the partnership. A TMP has authority to bind the partnership, but it cannot bind other partners, and under TEFRA, other partners are entitled to notice of and have the right to participate in IRS proceedings.

Code Section 6223 as revised by the BBA eliminates the concept of the TMP. Instead, the new rules require each partnership to have a "partnership representative," which is different from a TMP in significant respects. For example, the partnership representative is not required to be a partner; he or she can be any person who has a substantial presence in the United States. Also, the partnership representative has the sole authority to act for and bind the partnership and the partners regarding audit proceedings (regardless of any contrary provisions of state law or the partnership agreement), and the partnership representative has broad powers, including the power to enter into settlements, agree to notices of final partnership adjustments, and make a push-out election (discussed below).

A partnership must designate a partnership representative on its return for each taxable year. If a partnership does not properly designate a partnership representative, the IRS may designate any person to serve as the partnership representative. Considering the broad powers afforded a partnership representative, partners would be wise to have their partnership agreements require that the partnership appoint its own partnership representative and not leave the choice to the IRS.

Imputed Underpayment and Modification of Imputed Underpayment

Code Section 6225 as amended by the BBA and the proposed regulations provide that if the IRS adjusts any item of partnership income, gain, loss, deduction, or credit for a "reviewed year," the partnership is required to pay any imputed underpayment regarding such adjustment in the "adjustment year." For this purpose, a "reviewed year" is the tax year under examination, and the "adjustment year" is the year that an audit or judicial review is completed. The imputed underpayment is generally the net amount of partnership adjustments multiplied by the greater of the highest federal income tax rate applicable to individuals for the reviewed year or the highest federal income tax rate applicable to corporations for the reviewed year. Because the imputed underpayment is payable by the partnership in the adjustment year, the partners during the adjustment year bear the economic burden of the imputed underpayment, even if they were not partners during the reviewed year.

Code Section 6225(c) of the new audit rules allows a partnership to modify an imputed underpayment in certain situations, with IRS approval. One situation in which a modification may be granted is if (1) one or more partners file amended returns for the reviewed year and for any subsequent year in which a tax attribute is affected by an adjustment for the reviewed year, (2) the amended returns take into account all adjustments that are properly allocable to such partners, and (3) such partners pay any tax due with their amended returns. The imputed underpayment to the partnership will then be determined without the adjustments that were included in the amended returns.

A partnership with at least one tax-exempt partner during the reviewed year may request a modification based on the partner's tax-exempt status. If the modification is approved, the imputed underpayment will be calculated without regard to the portion of the adjustment that is allocable to the tax-exempt partner and for which the tax-exempt partner would not have been subject to tax in the reviewed year. However, the adjustment will not be modified to the extent that an otherwise tax-exempt partner would have been subject to tax with respect to the adjustment. For example, if the IRS examines a partnership that has two equal partners, one of which is tax-exempt (X), and the IRS makes an adjustment to increase the partnership's income by $100, the partnership representative can request a modification based on X's tax-exempt status. If the IRS approves the modification request, it should reduce the $100 adjustment by $50, which is the portion allocable to X. However, if 40% of the $50 adjustment allocable to X is unrelated business taxable income to X, then the modification would be only $30 (the portion of the adjustment to which X would not have been subject to tax in the reviewed year).

A modification can also be requested to lower the tax rate that was used to determine an imputed underpayment from the default highest individual or corporate rate. If a partnership has C corporation partners, the partnership can request that a lower rate be applied to the portion of the adjustment allocable to such partners, and if a partnership has capital gain or qualified dividend income, the partnership can request a lower rate to the extent that such items are allocable to individual partners.

Push-Out Election

Code Section 6226 as amended by the BBA allows a partnership to elect to push out the partnership audit adjustments to its reviewed-year partners. If an effective push-out election is made, the partners, and not the partnership, take the partnership adjustments into account and are liable for any resulting tax, penalties, and interest. The effect of a push-out election is consistent with the pass-through nature of a partnership and puts the tax burden on those who were partners during the reviewed year rather than on the partnership and, indirectly, the adjustment-year partners.

An electing partnership must file a push-out election and furnish to each reviewed-year partner and the IRS a statement reflecting such partner's respective share of the partnership adjustments for each reviewed year. If a push-out election is made, each reviewed-year partner must take into account the adjustments listed on the partner's statement received from the partnership and pay with the partner's adjustment-year return (1) any additional tax, penalties, and interest resulting from the partner's share of the partnership adjustments for the reviewed year, plus (2) if the adjustment of tax attributes for the reviewed year affects any of the partner's returns for years after the reviewed year and before the adjustment year ("intervening years"), any resulting additional taxes, penalties, and interest for such intervening years. The extent to which a partner owes additional tax because of the push out of partnership adjustments depends on the partner's particular tax situation, such as if the partner is tax-exempt or the partner has net operating losses that can be applied against the adjustments.

The proposed regulations require a partnership that makes a push-out election to compute a "safe harbor" amount of tax and a safe harbor amount of interest, which must be included in the statements furnished to the reviewed-year partners. The proposed regulations set forth the procedure for calculating the safe harbor amounts. A reviewed-year partner can elect to pay the safe harbor amount in lieu of the additional reporting year tax, but it is unlikely that a tax-exempt partner would elect to pay the safe harbor amount.

The proposed regulations do not address how the push-out election will apply to partnerships that have pass-through entity partners (i.e., tiered partnerships). The IRS has expressed concern that allowing upper-tier entities to push out adjustments to their partners will result in complexities and challenges similar to those that exist under TEFRA, which Congress had hoped to resolve with the new audit rules. The IRS has reserved this issue and may issue additional proposed regulations to address how to administer the push-out election in a tiered partnership structure.

Available Protective Measures

Obviously, the BBA will significantly change partnership audit procedures, including how taxes resulting from partnership audits will be assessed and collected. While these changes will affect all partners, the greatest impact will likely be felt by tax-exempt partners. Thankfully, there are steps that tax-exempt partners can take to lessen or eliminate the sting of the new rules.

Perhaps the most important action involves the partnership representative. As noted above, a partnership representative has the sole authority to act for and bind the partnership and its partners. To protect its interests, an exempt partner should have itself appointed as the partnership representative with powers as broad as possible to make all elections and other decisions for the partnership in connection with partnership audits. If a partner is unable to be appointed as the partnership representative, it should negotiate to have the partnership agreement limit the power of the partnership representative to enter into settlements or make elections that bind the partnership and the partners without their consent. Under law, any actions taken by the partnership representative regarding an audit are valid and binding on the partnership regardless of any limitations set forth in the partnership agreement. However, the partners can agree among themselves to limit the partnership representative's powers, and if the partnership representative takes any action that exceeds such limits, the partners can bring an action for breach of contract.

If a tax-exempt partner is unable to be appointed as the partnership representative with broad powers, it should request that the partnership agreement require the partnership representative to elect to opt out of the new audit rules, if the partnership qualifies to do so, or to make a push-out election if the partnership does not opt out of the new rules. The partnership agreement should also provide that if the partnership fails to opt out of the new rules or make the push-out election, the partnership representative will request all applicable modifications under Code Section 6225, and the partners will take the actions necessary to secure such modifications.

The partnership agreement should also (1) address how the partners will share any tax assessed against the partnership in the event that the partnership does not opt out of the new rules or make a push-out election, (2) require current and former partners who were partners during a reviewed year to contribute their allocable share of any taxes owed by the partnership as a result of an audit, (3) provide that any current partner that is a successor to a former reviewed-year partner be responsible to the extent its predecessor does not pay the predecessor's share of the reviewed-year tax, (4) require the partnership representative to provide the partners with copies of notices and other communications received in connection with an audit, and (5) provide that the audit procedure provisions of the partnership agreement are binding on all current and former partners and that they survive the termination of the partnership.

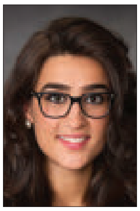
In addition to the foregoing protections, a partner joining an existing partnership should request to be indemnified against any liability for prior-year taxes, including indirectly as a result of any partnership-level imputed underpayment, relating to a reviewed-year prior to when the new partner joined the partnership. This is generally not necessary under TEFRA because under TEFRA the partnership adjustments are passed through to those who were partners during the year under audit, which would not include the new partner. However, because under the new rules a partner can become directly or indirectly liable for taxes attributable to years before becoming a partner, a new partner should request indemnification from the other taxable partners (if the new partner acquired the interest from the partnership) or from the selling partner (if the interest was acquired from another partner).

Conclusion

With only a few months until the new audit rules become effective, it is important that tax-exempt partners become familiar with the new rules, including available elections and other ways they can protect themselves against becoming directly or indirectly liable for tax, should the partnership be audited. A partner should also consider reviewing and revising existing partnership agreements to address the partnership representative concept and other aspects of the new audit rules. Failing to seriously consider and address the potential consequences under the new rules could result in a tax-exempt partner essentially bearing the same economic burden as a taxable partner if the partnership is audited. ■

Paul S. Drizner is a Partner with Seyfarth Shaw LLP.

The Evolution of Commercial Mortgage Risk Management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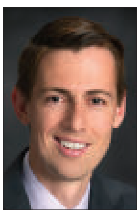

William Pattison
MetLife Investment Management

Many institutional investors view commercial mortgages as an attractive, complementary, and lower-risk alternative to real estate equity. History shows, however, inadequate risk management can lead to significant losses in commercial mortgage lending, particularly when the investments originate during the later stages of a real estate cycle. The market cycle influences commercial mortgage performance in a similar fashion to real estate equity, but the defining characteristics of the cycle can play an even more important role in the former case. Prudent risk assessment in commercial mortgages can be relatively complex, however, and must consider the myriad of potential loan characteristics, structures, collateral characteristics, sponsorships, and other attributes that may contribute to risk. Lenders who employ effective risk management throughout cycles, especially during periods of significant stress, are better able to minimize losses on a relative basis.

Risk Management

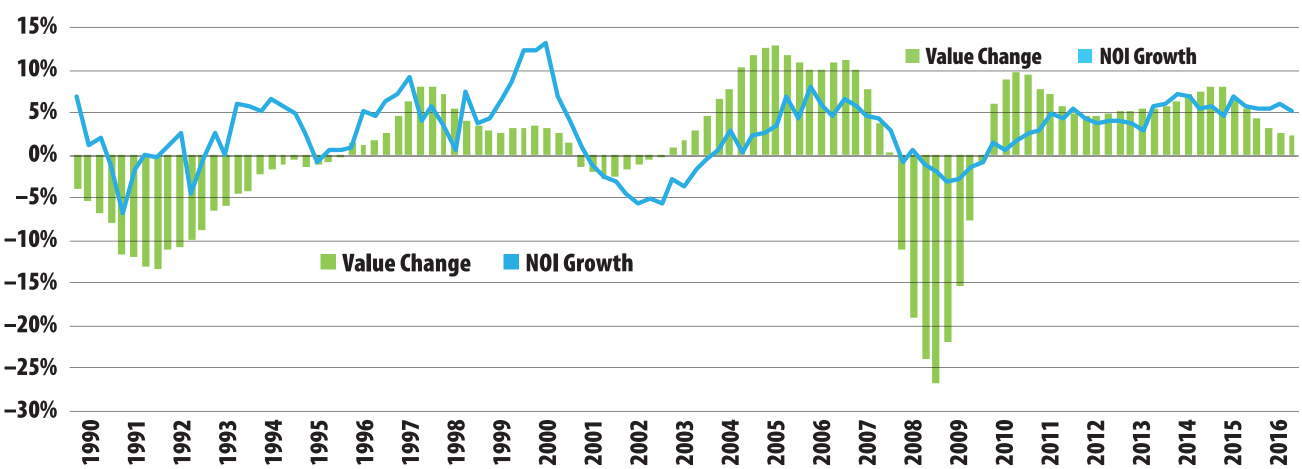
The primary risks associated with commercial mortgage lending can be classified as operational risks, which are related to operational controls, information systems, or corporate governance; credit risks, which are associated with the likelihood that counterparties, such as sponsors, tenants, and co-lenders, will not fulfill their financial obligations; and market risks, which are associated with the economy, capital markets, interest rates, currency rates, investment sectors, and geographies.

Although operational and credit risks are critical components of portfolio- and loan-level risk management programs, market risks are arguably the most difficult to anticipate and manage. This is because applicable market risks vary considerably by investment and are subject to material changes over time. Market risk metrics that have proved most useful in identifying emerging risks and strategically positioning portfolios for one cycle have not necessarily been the most helpful in subsequent cycles. A look back at real estate investment performance across cycles can help illustrate variability in the key drivers of real estate market downturns and the characteristics of the best-performing loans through each cycle.

Early 1990s: Converging Fundamental and Capital Market Pressures

The past three decades have produced three primary economic and corresponding real estate cycles, illustrated in Exhibit 1. The first major real estate downturn occurred during the early 1990s. Leading up to this downturn, policy and regulatory changes, including the Depository

Exhibit 1: Year-Over-Year Market Value Change and Income Growth Through Cycles



Source: NCREIF
Note: Data are as of 2Q2017.

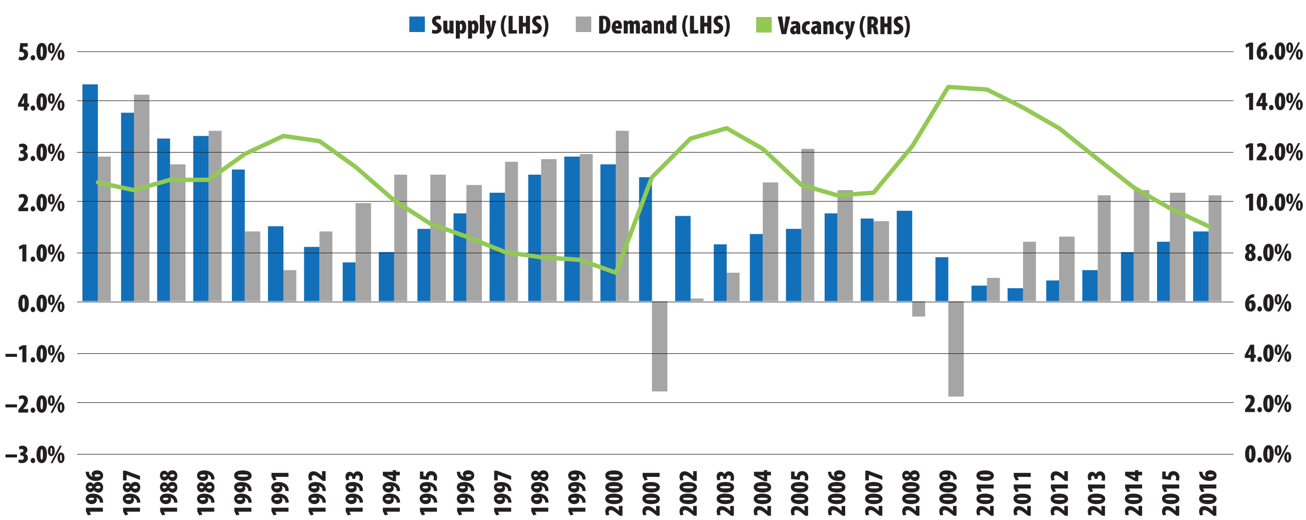
Institutions Deregulation and Monetary Control Act of 1980 and the Economic Recovery Tax Act of 1981, contributed to increased capital flows to real estate. This increase in equity capital coincided with an increase in undisciplined lending from savings and loan institutions, which drove significant amounts of new construction. As a result, supply growth exceeded 4% in the mid-1980s. Construction slowed dramatically following the passage of the 1986 Tax Reform Act, but the reduction was too late to stem the tide of rising vacancies that accompanied the early 1990s recession. As a result, rents declined broadly across the United States, and property prices, as measured by the NCREIF appreciation index, fell 32% from peak to trough between 1990 and 1995. The failure of many savings and loan institutions, along with persistent weakness in fundamentals, caused both investors and lenders to lose confidence in the market, and capital for commercial real estate grew scarce. Commercial mortgage default rates and losses increased significantly, negatively impacting lenders of all types.

In the years preceding the early 1990s downturn, lenders measured risk primarily by examining loan-to-value (LTV) ratios, with debt service coverage ratios (DSCRs) as a secondary, but important, consideration. However, the competitive lending environment pushed many lenders to relax standards for both; LTVs of 80% or higher were relatively common. In the early stages of the downturn, DSCRs began to fall below 1.00x, leading to term defaults not long after. As the downturn progressed, illiquidity in the capital markets led to maturity defaults as borrowers were unable to refinance. These conditions persisted for several years, pushing cumulative losses to record levels for many lenders. Though this experience was painful, it positively influenced risk management programs at many firms.

Early 2000s: Technology Bubble Causes Fundamental Demand Collapse

One of the major drivers of the late-1990s/early-2000s economy was the emergence of a new segment of the tech sector consisting of many small Internet-focused companies, dubbed "dot-coms." With few viable business plans and little operational discipline, combined with unrealistic stock valuations, many of these companies quickly failed. The result was a precipitous decline in real estate demand in the markets where they proliferated, such as

Exhibit 2: Real Estate Fundamentals



Source: CBRE Econometric Advisors
Notes: Data are for office and industrial only, as of 2Q2017.

Exhibit 3: Cumulative Expected Loss by Chicago Property Type (in Basis Points)

	CBRE EA Upside Expansion	Moody's Stagflation Recession	Moody's Next–Cycle Recession	Federal Reserve Adverse Stress Test
Retail	67	204	145	253
Industrial	45	261	182	215
Office	53	278	230	132
Apartment	38	206	208	162

Sources: Moody's CMM, CBRE EA, Federal Reserve Board

Exhibit 4: Cumulative Expected Loss for an Office Mortgage by Market (in Basis Points)

	CBRE EA Upside Expansion	Moody's Stagflation Recession	Moody's Next–Cycle Recession	Federal Reserve Adverse Stress Test
New York City	50	239	213	117
Washington, DC	55	232	206	116
Chicago	53	278	230	132
Boston	44	217	216	111
Los Angeles	86	272	252	122
Houston	59	221	178	113
Dallas	75	210	198	103
Atlanta	61	231	211	113
Philadelphia	49	256	228	135
Denver	85	213	202	106

Sources: Moody's CMM, CBRE EA, Federal Reserve Board

San Francisco and Seattle. Vacancy rates rose dramatically (Exhibit 2), and market rents fell quickly. Property incomes declined at an unprecedented pace, falling 10% in just over two years, far exceeding the pace of decline in the early 1990s. However, supply was more in balance leading up to 2001 relative to the previous recession, totaling less than 3.0% of existing stock. Property values were only modestly impacted, declining 3.0% peak to trough, and capital flows into the real estate sector remained relatively intact as investors sought the perceived safety of hard assets. The continued investment demand placed downward pressure on capitalization rates, largely insulating property values. Real estate investors and lenders who understood the transitory nature of the negative fundamental environment associated with the dot-com bubble remained in the market. Commercial mortgage default and loss rates in this downturn were relatively modest in spite of the magnitude of property income losses.

During this downturn, DSCR ratios came under immediate stress as incomes fell rapidly amid rising vacancy rates. However, with values falling only modestly, LTVs were not dramatically affected. Owners were more willing to carry the assets in anticipation of recovery. Also, as debt and equity capital remained largely available, maturity defaults were kept at bay. In this downturn, while DSCRs signaled severe losses, resilient LTVs helped mitigate the stress.

Late 2000s: Global Financial Crisis

The economy's most recent downturn was very different from both the property market bust of the early 1990s and the dot-com bubble in the early 2000s. When the economy entered the Great Recession, the impact on commercial property markets was twofold. First, many businesses chose to reduce headcount, laying off workers but often not enough to close entire offices. Net operating income (NOI) dropped a mere 4.5% peak to trough, thereby lessening the potential for term defaults. The more important effect was from the capital markets. The abrupt closure of the CMBS market, and overall investor paralysis amid the uncertainty, caused a rapid and severe repricing of real estate assets, with values declining 32% in two years. In the face of this severe correction, the commercial mortgage lenders that appropriately positioned their portfolios emerged relatively unscathed.

The global financial crisis offers an interesting contrast to the experience of the early 2000s. As values rapidly declined amid severe capital market dislocation, LTVs moved quickly higher. Unlike the early 2000s, tenant credit was not the primary issue, and property incomes remained mostly intact. Although LTVs signaled severe stress, the limited impact to DSCRs allowed borrowers to keep mortgages current until property prices recovered.

The past 35 years, and three downturns, taught lenders that in strategic positioning and managing portfolio risk, they must consider DSCR, LTV, and tenant credit. In today's context of perpetually low interest rates, these metrics alone may not provide sufficient insight to the level of risk lenders face. As a result, debt yield is also an important metric. Debt yield is defined as NOI divided by loan amount. Debt yield ignores capital value changes

1. Ratings and losses were estimated using Moody's Commercial Mortgage Metrics (CMM) with summer 2017 assumptions from CBRE EA, Moody's Economic and Consumer Credit Analytics, and the Federal Reserve. Office mortgages averaged 70% LTV with a five-year term, 2.0x DSCR, 7% debt yield, and 3.7% mortgage coupon.

as well as the interest rate and amortization. It focuses on the appropriate ratio of leverage to NOI. By employing debt yields, lenders can ensure that low interest rates or exuberant capital markets do not mask the assumed risk.

Along with these metrics, losses can be significantly influenced by the quality of an asset and its sponsorship. In a situation in which an asset's DSCR falls below 1.00x and is operating at a loss, a high-quality asset provides the sponsor incentive to weather the stress of the cycle. Emphasis should also be given to the importance of financially strong and experienced sponsors. Such sponsors have the capability and wherewithal to fund shortfalls during periods of economic distress.

Concentration Risk Management

In addition to understanding the unique characteristics of each market cycle and strategically positioning portfolios appropriately, investors should also pay attention to concentration risk when managing market risk. They must identify the common characteristics across commercial mortgage assets that could lead to stress in pockets of the portfolio. Two of the more important characteristics include property type and geography.

To illustrate the risk posed by a high concentration in a single property type or market, Exhibits 3 and 4 show estimates of expected losses under a variety of economic scenarios for a selection of A-rated commercial mortgages across major US markets.[1] They include a CBRE Econometric Advisors Upside scenario, which reflects a rapid economic expansion; the Moody's Stagflation Recession scenario, which includes a severe recession and high inflation; the Federal Reserve Adverse Stress Test Recession scenario, which includes a moderate deterioration in both retail spending and labor markets; and the Moody's Next-Cycle Recession scenario, which includes a more significant labor market decline but a relatively mild decline in retail spending.

The performance of individual assets in the same market can vary significantly depending on property type. To illustrate, Exhibit 3 depicts commercial mortgages backed by collateral located in Chicago, one of the largest US real estate markets, across the four primary property types. The results show retail properties performed better than other property types under the Moody's Next-Cycle Recession scenario and worse under the Federal Reserve scenario. Conversely, office properties performed best under the Federal Reserve scenario and worst under the Moody's scenario. The reason for this divergence is that different property types cater to different sectors of the economy. For example, office fundamentals generally respond to labor markets, particularly the financial and services-producing sectors; industrial fundamentals respond to goods-producing sectors; retail fundamentals respond to consumer spending; and apartment fundamentals generally respond to household formations and age demographics. Thus, a commercial mortgage portfolio diversified by property type is better prepared for downturns that may primarily impact a single property type.

Similarly, different geographic locations have different economic and demographic drivers that affect commercial mortgage performance. For example, an office property in New York City may fare differently than a similar office property in Atlanta under the same national economic conditions. This is clearly illustrated by the results of the analysis shown in Exhibit 4. An office mortgage in Dallas is estimated to outperform other metropolitan statistical areas under the three recessionary scenarios but underperform under the CBRE-EA Upside scenario. A portfolio heavily concentrated in Dallas office mortgages could improve diversification by adding exposure in Philadelphia or Chicago; performance in these regions is higher in the upside scenario and lower in the three recession scenarios. Effective geographic diversification results from selecting investments in areas with fundamentally different economies.

Risk Management Implementation

Management's ability to understand loan concentrations and risk factors in a portfolio is critical to effective portfolio management. An effective risk management platform is supported by two pillars: first, a well-devised and risk-conscious investment strategy driving portfolio- and loan-level decisions and, second, a thorough monitoring system. A variety of quantitative tools and techniques exist, including portfolio optimization and liability matching, economic capital modeling, and others, that provide guidance for the most appropriate portfolio composition. These portfolio construction tools typically rely on a combination of risk, return, and correlation estimates for the potential assets in the portfolio and will vary based on any given investor's risk tolerance and return expectations.

These models, however, are primarily based on historical performance and should be used as general guidelines for longer-term portfolio composition. Because near-term risk and return opportunities in the sector vary through time and the factors influencing these opportunities can rapidly change, portfolio composition guidelines should incorporate material flexibility. Timely, on-the-ground information flows and appropriate feedback channels and processes for incorporating new information into investment strategy are paramount to effective risk management.

Portfolio- and loan-monitoring systems and periodic reviews are also essential to keep a portfolio aligned with its strategic objectives. Monitoring the exposures of the portfolio can serve as a method to ensure an investor is appropriately implementing these objectives. Finally, implementing risk management processes relies on embedding it into the culture and philosophy of the organization. Risk management should not be executed as a "stand-alone" functional area; organizations should rather strive for risk management to permeate through the firm's investment decision-making and monitoring processes. Each organization should have a balanced view from the research, portfolio management, and risk groups. Investment returns are the ultimate goal but must be adjusted for risk.

Conclusion

Commercial real estate conditions have fully recovered since the global financial crisis, and though there are few indications that a new recession is in the offing, planning for the day the next one arrives is prudent. Effective risk management throughout the cycle, in spite of significant market stress, has proved to mitigate losses. This includes ensuring appropriate risk management tools and processes are in place to monitor a portfolio and determine the potential impact of future economic conditions. Risk management processes that encourage active management of metrics, such as LTVs, DSCRs, debt yield, tenant credit, sponsorship quality, and portfolio concentration, can help investors attain superior risk-adjusted returns. ■

Sultane Cosaj is a Senior Analyst and William Pattison is an Associate Director in the Real Estate and Agricultural Finance Group at MetLife Investment Management.

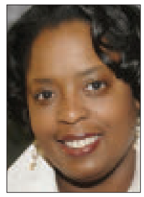
PREA Scholarship and Grant Recipients

In keeping with its educational mission, the Pension Real Estate Association awards scholarships annually to promising students studying real estate at the undergraduate and graduate levels. PREA's scholarships have been distributed to students at 54 academic institutions. We congratulate the following 2017 scholarship recipients.

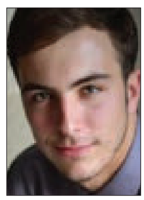
Nick Brown is a second-year MBA real estate candidate at the Wisconsin School of Business. He serves as Co-President of the Real Estate Club and is the Portfolio Manager for the Applied Real Estate Investment Track (AREIT). Last summer, Brown interned in the Real Estate Investments Group at Pacific Life, where he assisted in the underwriting of first mortgage and construction loans on all major product types. Prior to Wisconsin, Brown worked as the Operations Manager for a residential development firm. Upon graduation, he plans to continue his career in real estate investment management.

Lyndon Chang is a fourth-year student at the University of Southern California, studying international business with a concentration in real estate finance. He participates in the Trojan Real Estate Association, is a competing member of the Marshall Case Team, and is the Director of trip fund-raising for Global Brigades @ Marshall. Chang completed internships in CRE with several banks in previous summers. As a Trojan, he has been able to further expand his knowledge of the industry by examining the real estate market of Los Angeles and meeting fellow alumni within the industry. He hopes to continue pursuing CRE and real estate finance, with long-term plans to break into development.

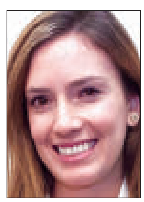
Ryan Lovell is a 2019 MBA candidate at the University of Chicago Booth School of Business. He began his career in Hong Kong as a Management Consultant for EC Harris, performing due diligence and investment analysis for globally recognized clients within the property and infrastructure sector. After joining Citigroup to focus on retail real estate strategy across Asia-Pacific, Lovell moved to Shanghai to manage the China portfolio. Currently based in New York, he directs the bank's portfolio activities across the eastern United States. In 2010, Lovell earned a BBA in real estate finance and a minor in Mandarin Chinese from Southern Methodist University, where he was awarded the CCIM Institute University Scholarship and the ICSC Undergraduate Real Estate Award.



Katrina Malone is an Executive MBA candidate from the Kellogg School of Management at Northwestern University and holds a bachelor's degree in liberal arts and economics from Xavier University. She completed a certificate in financial decision making from the University of Chicago Graham School of Professional Studies and recently joined the Graham School's FDM Curriculum Advisory Council. Malone is a recipient of the Goldie B. Wolfe Miller Women Leaders in Real Estate Initiative Scholarship Award and the American Association of University Women's Selected Professions Fellowship.



Patrick Morse is a junior at Ohio State University's Fisher College of Business and plans to pursue a career in commercial real estate. Last spring, he completed a fast-paced accounting internship with Novogradac and Company CPAs, where he prepared audited financial statements and tax returns for apartment projects backed by the low-income housing tax credit. Morse is experienced at product development and developed pizza for two premium pizza brands. He has been exposed to menu development, location analysis, architectural design, accounting, contracts, marketing, labor management, customer service, and operations efficiency.



Ana Daniela Rodriguez is an MDes Real Estate and the Built Environment candidate at the Harvard University Graduate School of Design, where she is focusing her studies on development and investment. She is part of the communications team at the Harvard Joint Center for Housing Studies. In 2016, Rodriguez was elected a FIABCI Scholar. Prior to Harvard, she worked at BDG Architects in Miami. Additionally, she was the Project Coordinator at iCapital PM, an international developer building its first multifamily condominium project in the United States. Rodriguez received a Master of Science in construction management from Florida International University and a Bachelor of Architecture from Philadelphia University.

Macy Trizonis is a third-year student at the University of Florida, pursuing both a Bachelor of Science in business administration with a major in finance and a Master of Science in real estate. She is involved with the UF Real Estate Society and currently serves as the Vice President of communications. Trizonis is presently working as a rotational intern at NAI Hallmark Partners in Jacksonville, FL, and supports the brokerage team by providing research and market analysis and assists in the property management and leasing of the company's portfolio.

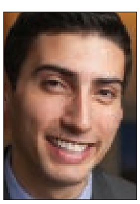
Andrew Wade is an MDes Real Estate and the Built Environment candidate at the Harvard University Graduate School of Design. Last summer, he worked as a Financial Analyst for Blue Hawk Investments, a value-added integrated private equity development firm in Newton, MA. Wade is a member of H Square, a start-up focused on student housing admitted to the Venture Incubation Program at the Harvard Innovation Lab. Prior to Harvard, Wade was the J. Clawson Mills Fellow at the Architectural League of New York. He holds an MS in development planning from University College London and a BS in architecture from McGill University.

Jimin Won is a first-year MBA/MPS student in the dual-degree program at Cornell's Johnson School of Management and the Baker Program in Real Estate. Last summer, he worked as a business development consultant for a boutique design and interior architecture group in Laguna Beach, CA. He began his professional career as a member of Hanjin Shipping's Global Management Training Program, working in Seoul, South Korea; Paramus, NJ; and Shanghai, China. His long-term assignment in Shanghai included overseeing operational efficiency of Hanjin's real estate assets in mainland China and analysis of potential inland land-use acquisition.

PREA-Toigo Fellowship Grant Recipients

PREA and the Robert Toigo Foundation have collaborated for the past 13 years to support the educational and professional development of minority students pursuing careers in real estate. We congratulate the following 2017 recipients of the PREA-Toigo Fellowship Grants.

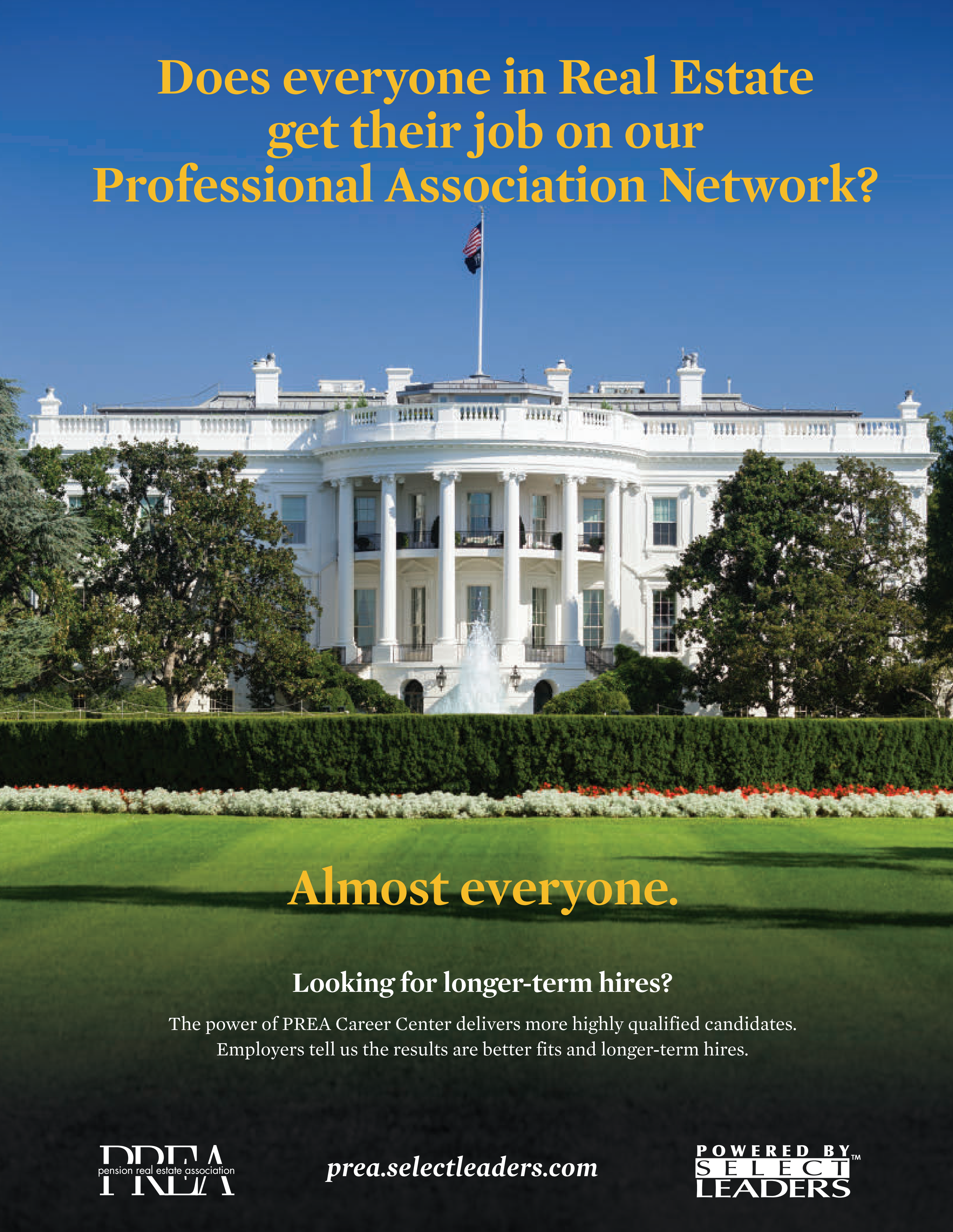
David Chan is a second-year MBA student at Harvard Business School and is interested in the nexus of climate change and investment management. Over the past year, Chan has interned with Palm Drive Capital and Prudential Agricultural Investments, where he worked on valuations, acquisitions, and strategic initiatives. At HBS, Chan is Co-President and CFO of the Food, Water, and Agriculture Club. He also represents HBS on the Harvard Graduate Council, serves as the HBS School Team Captain for the Toigo Foundation, and sits on the board of the HBS Latino Student Organization. Chan received a BS in atmospheric science from Cornell University.



Ruben Ortega is a second-year MBA candidate at Harvard Business School. Prior to business school, Ortega worked as a financial analyst in private wealth management at Goldman Sachs. He graduated from Cornell University with a degree in hotel administration with a minor in real estate. This past summer, Ortega worked as a summer Associate on the real estate acquisitions team at Hersha Hospitality, a hotel REIT. He aspires to a career as a real estate hotel investor focused on creating affordable luxury hotels. Ortega is the Treasurer for the Cornell Latino Alumni Association and is actively involved with the Point Foundation, a national LGBT scholarship fund.

Kyle Smith is an MBA candidate at the University of Chicago. Prior to graduate school, Smith served six years in the US Air Force as a Procurement Officer, managing multimillion dollar weapon systems and construction contracts on behalf of the Department of Defense and foreign allies. During the school year, Smith worked with HFF Chicago in investment sales and recently finished a summer internship with USAA Real Estate Company, where he worked in acquisitions and asset management. Smith holds a Bachelor of Arts in economics from Howard University.

Mandy (Chi Man) Yeung is a second-year MBA candidate at Columbia Business School, where she serves as Vice President of Trips in the Real Estate Association and Vice President of Women's Week in Columbia Women in Business. Last summer, Yeung interned at DDG Partners, a vertically integrated real estate investment, development, and management firm. She focused on development and divided her time among five active projects in various stages of development. Before Columbia, Yeung spent five years with Turner Construction as a Project Engineer, where she managed the building process from preconstruction through closeout. She graduated from the University of Southern California with a degree in civil engineering.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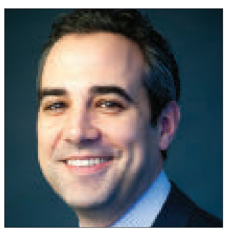
Elizabeth (Liz) Bell has joined Jaguar Growth Partners as Principal on the firm's investment team. She is based in Jaguar's New York office and leads the investment team in the firm's activity in Latin America and beyond. Before joining Jaguar, Bell was an Investment Manager on the property multi-manager team at Aberdeen Asset Management. Prior to Aberdeen, she was Vice President on the investment team at Equity International, where she was responsible for originating, executing, and managing investments across Latin America and Asia. Bell also worked as a Summer Fellow in the real estate group at the KAUST Endowment, as an Associate at J.E. Robert Companies with a focus on Latin American real estate, and as an Investment Banking Analyst in the equity capital markets group at Deutsche Bank.

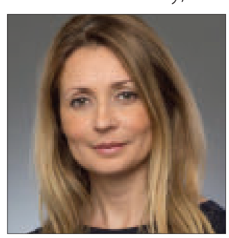
Jacqueline Brady has joined PGIM Real Estate's Americas Business Development team as an Executive Director. Based in New York, she focuses on client relationship management and fund-raising efforts. Brady joins PGIM Real Estate with more than two decades of experience in the real estate debt capital markets and a wealth of capital-raising experience. Most recently, she was a Senior Leader at CenterSquare Investment Management, where she was responsible for enhancing and developing CenterSquare's relationships with institutional clients and consultants and introducing the firm's real asset capabilities to new markets. Previously, Brady was a Principal and Portfolio Manager at Canopy Investment Advisors; Capmark Investments, LP; the Greenwich Group; and Nomura Securities International.

Rahul Ghai has been appointed as a Managing Director at Partners Group in its Singapore-based Private Real Estate team. In his new role, Ghai focuses on direct investments across the Asia-Pacific region. He brings close to 15 years of experience in the real estate investment industry. Prior to joining Partners Group, Ghai was Head of Transactions, Asia-Pacific, and Head of Real Estate for South East Asia and Australia at Deutsche Bank Asset Management. Previously, he also worked for Standard Chartered Bank Principal Finance, Istithmar World, and Jones Lang LaSalle.



Jay McNamara has been appointed Global Head of Real Estate at MSCI and a member of the Executive Team. He joined MSCI in 2002 and has led its Americas Client Coverage for the past five years, with responsibility for nine offices across North and South America. He is a member of the firm's Executive Committee. Prior to his current role, McNamara held the position of Global Head of Asset Owners and managed a team of more than 40 people based in 15 offices around the globe, working with pension plans, sovereign wealth funds, endowments, investment consultants, and other institutional investors.

James Mitchell has joined American Realty Advisors as its new Senior Vice President/Client Portfolio Manager. He is responsible for leading the firm's sales and client service efforts nationwide for ARA's Taft-Hartley relationships through the firm's commingled funds and separate accounts. Most recently, Mitchell was National Director of Asset Management Relationship Development for BMO Asset Management, focusing on customized asset management, trust and custody, and banking needs of the labor community. Prior to joining BMO, Mitchell worked at Northern Trust as a National Director of the Taft-Hartley Investment Client Solutions Group. He also previously served as Executive Director of the Inter-Local Pension Fund/Graphic Communication Conference of the International Brotherhood of Teamsters, the Automobile Mechanics Local 701 as the Controller, and at Thomas Harvey, LLP.



Ibtissem ("Ibti") Sfaxi has been appointed Principal at Hodes Weill & Associates in its London office with primary responsibility for coverage of institutions and family offices in the Middle East and Europe. She joins from Aberdeen Standard Investments, where she was a Senior Business Development Manager and Property Product Specialist. Sfaxi joined Aberdeen Asset Management in 2012 from Pradera Real Estate, where she was responsible for business development in Europe and the Middle East. Prior to joining Pradera, Sfaxi was a Vice President at JER Partner's London office and was responsible for capital raising for the company's various opportunistic fund offerings. Sfaxi began her career in property business development in 2003 at Capital & Marketing Group.

Kimberly Smith has joined CS Capital Management, Inc., as Managing Director. Her duties include asset management, acquisitions, and investment management oversight. Smith has more than 20 years of experience in institutional real estate asset management, property management, and accounting. She has previously held senior positions at KBS Realty Advisors, the Koll Company, and Cassidy Turley.

Kyle Torpey has joined Madison International Realty as Director of Investments, part of the team responsible for the origination, underwriting, and execution of Madison transactions in the US and global markets. Torpey joins Madison from Goldman Sachs, where he was a Vice President in the real estate investment banking division, focused on M&A and capital markets. Previously, he served as an Associate in real estate investment banking at Lazard and UBS in a similar capacity. Torpey served in the US Army as a Captain.

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