

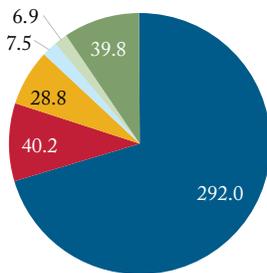
Real Estate Derivatives: A Primer

By Caroline Clapp, AEW Research

Exhibit 1

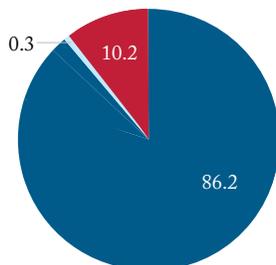
Global OTC Derivatives

Notional Outstanding December 2006
(trillions of U.S.\$)



Global Exchange Traded Derivatives

Notional Outstanding June 2007
(trillions of U.S.\$)



Source: Bank for International Settlements

INTRODUCTION

For many, derivatives are often associated with infamous financial events and scandals resulting from highly leveraged and speculative use of derivative financial instruments. The most common use of these instruments is, however, in the often quiet area of risk management rather than the charged atmosphere of high stakes betting. At the most basic level, a derivative is simply a financial instrument that allows two parties to enter into a relationship where one party gains more exposure to the performance of a specific asset while the other party reduces their exposure to the same asset. These agreements have been in use for centuries in agriculture and commodity trading and, in modern times, have evolved in complexity along with the global financial system to cover virtually all aspects of the capital market. Until recently, the one glaring exception to this has been the largely private investment market of residential and commercial property, particularly in the United States. Today, there is an emerging market of derivative instruments for property investment. While still embryonic, this market holds the promise of potentially significant benefits for real estate investment practices and markets. Specifically, a fully formed and functioning derivatives market for commercial property lifts the opaque veil of the private market that has retarded information efficiency and hampered price discovery in this multi-trillion dollar investment market. All real estate investors, regardless of their specific interest in using these instruments, should support the development of this market and the numerous benefits that they will ultimately bring to the asset class.

The modern concept of derivatives have been in use for many centuries and date back at least as far as the seventeenth century when options were traded on the market for tulip bulbs in Holland and futures were traded for rice in Japan¹. More recently in the U.S., research on pricing derivatives in the 1970s by economists Fischer Black, Myron Scholes and Robert Merton laid the foundation for derivatives to begin to trade in the U.S., when the Chicago Mercantile Exchange began to trade currency futures and the Chicago Board Options Exchange began to trade stock options.

A derivative is an asset that derives its value from another asset, typically referred to as the underlying asset. Derivatives can be used to hedge exposure to, or gain exposure to, an asset class without directly buying the underlying asset. Types of derivatives regularly traded globally today include options (e.g. puts and calls), forwards, futures and swaps.¹ These instruments have been fully developed for many global asset classes such as interest rates, credit default swaps, commodities and equities, as well as alternative derivative instruments such as weather. Indeed, the global market for derivatives across all asset classes totals more than \$300 trillion dollars, orders of magnitude greater than the size of the underlying asset classes themselves (Exhibit 1).

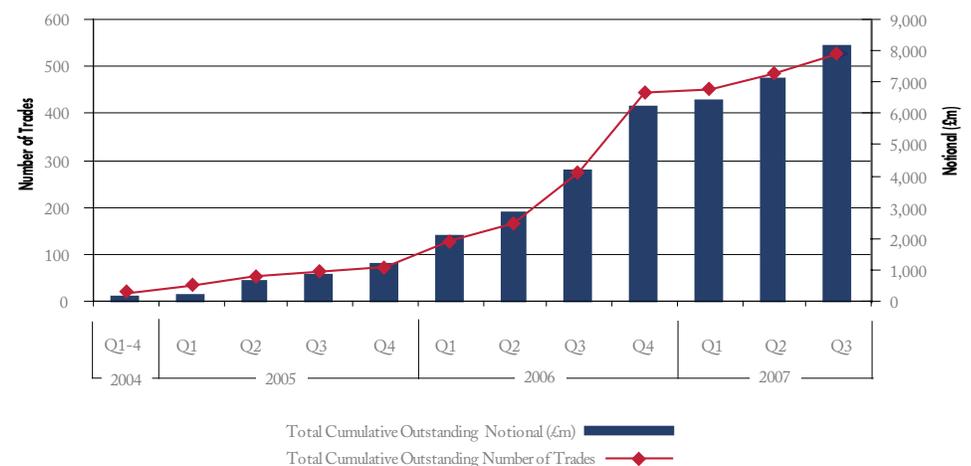
REAL ESTATE DERIVATIVES

While real estate derivatives are still in a nascent stage in the U.S., these types of products have been traded in the United Kingdom since the early 1990s. While an attempt to trade futures on the Investment Property Databank (IPD) in 1991 failed due to scandal, Barclays Bank successfully introduced two bond-like derivative instruments not long thereafter: Property Index Certificates (PICs) in 1994 and Property Index Forward (PIFs) in 1996. In early 2005, the first pure real estate swap referencing the IPD was put together by Deutsche Bank and Eurohypoⁱⁱ. Since then, trading in these instruments in the U.K. has been gaining steady momentum. Total cumulative outstanding notional value (i.e. the underlying value of referenced IPD in all outstanding derivative contracts) reached nearly eight billion pounds in the third quarter of 2007, roughly twice the notional amount on which property market derivatives traded a year earlier, according to the Investment Property Databank.

Moreover, the number of cumulative trades outstanding has nearly doubled from the third quarter of 2006. As illustrated in Exhibit 2, real estate derivatives are gaining momentum in the U.K. While the success in the U.K. market in recent years has helped renew investor interest in the U.S. real estate derivatives market, there are a few reasons that may explain why the U.K. market is developing more rapidly than the U.S. real estate derivatives market, according to CBRE Investorsⁱⁱⁱ.

Exhibit 2

U.K. Property Market Derivatives



Source: IDP/IPF Trade Volume Report

ⁱA detailed definition and examples of forwards and swaps follows on page 4.

First, the U.S. is much more geographically fragmented than the U.K. While the U.K. is primarily comprised of one commercial real estate market (London) with one commercial real estate index (the IPD), the U.S. is comprised of multiple property markets with several indexes evolving to track these markets.² As a result, investors are having difficulty determining which indexes will dominate going forward. More importantly, the IPD index tracks a far larger share of the U.K. property market than the comparable indexes in the U.S. Another potential reason that the market for real estate derivatives developed more quickly in the U.K. is cost incentives. Higher transaction costs for physical property in the U.K., where a stamp duty tax results in transaction costs equal to 7-8% of property value, as compared to transaction costs in the U.S. which typically equal only 3-5% of property value, creates greater incentive for investors to integrate derivatives into their real estate investment strategies.

Nevertheless, progress is being made in developing the U.S. commercial real estate derivatives market. In October of 2006, Credit Suisse opened up its exclusive license with the National Council of Real Estate Investment Fiduciaries (NCREIF), and since then several other banks have signed up to trade derivatives on the NCREIF Index, or NPI (Exhibit 3). Moreover, the U.S. real estate derivatives market, while still in its formative stage, has the potential to evolve into a large asset class. There is roughly \$5-7 trillion of commercial real estate in the U.S.^{iv}; a real estate derivatives market would be large indeed if contracts were traded upon even a fraction of the notional value of this market. For example, suppose that, similar to equities, the commercial real estate derivatives market grew to roughly one-third the notional value of all commercial real estate in the U.S.; if this occurred, the derivatives market would reach nearly \$2 trillion (Exhibit 4).^v

Exhibit 3

Licenses to Trade NPI Derivatives

Bank of America
 Credit Suisse
 Deutsche Bank
 Goldman Sachs
 Lehman Brothers
 Merrill Lynch
 Morgan Stanley

Source: NCREIF

Exhibit 4

Market Values- Underlying Vs. Derivatives

	U.S.	% of Underlying Market	World	% of Underlying Market
GDP	12.5	-	44.5	-
Equities	17.0		37.1	
Equity Derivatives	6.1+	36.1%	14.4+	38.8%
Fixed Income	27.4		45.0	
Fixed Income (Interest Rate) Derivatives	126.0	459.5%	324.9	722.1%
Commercial Property	5.3		15.0	
Commercial Property Derivatives Potential	1.9	36.1%	5.8	38.8%

Source: GFI Group/CBRE Melody

Although transaction data is not yet regularly reported by exchanges in the U.S., there is anecdotal evidence that real estate derivatives are gaining traction. For example, according to GFI Group/CBRE Melody^{vi}, a brokerage service for derivatives products, the company has facilitated roughly two dozen commercial real estate derivative trades for a total notional value of approximately \$300-\$400 million. Additionally, trading volume on a newly formed U.S. housing index, Residential Property Index (RPX), has exceeded \$250 million notional value since trading first began in late September 2007, according to Radar Logic Incorporated.

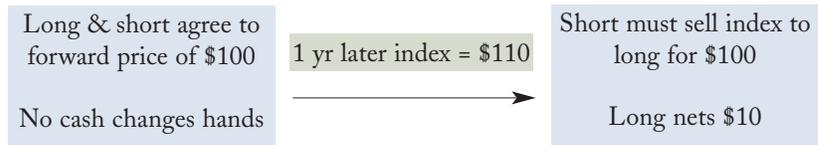
²A detailed discussion of U.S. real estate indexes follows on pages 8-10.

CONSTRUCTING REAL ESTATE DERIVATIVES

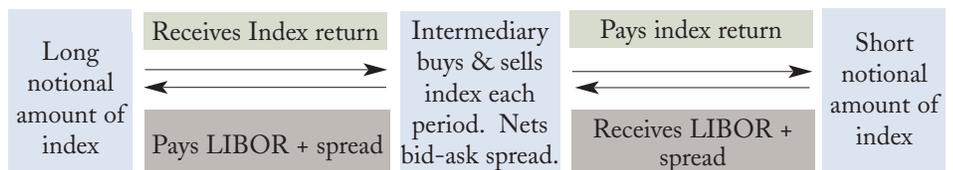
A real estate derivative is simply constructed with a contract providing a claim on an underlying real estate index^{vii}.

$$\begin{array}{|c|} \hline \text{Real Estate} \\ \text{Index} \\ \hline \end{array} + \begin{array}{|c|} \hline \text{Contract Claim} \\ \text{on Real Estate} \\ \hline \end{array} = \begin{array}{|c|} \hline \text{Real Estate} \\ \text{Derivative} \\ \hline \end{array}$$

Real estate derivative products are based on periodic returns of commercial real estate indexes and can be used to allow synthetic investment in commercial real estate or to hedge existing investment risk. The most basic derivatives are forwards and swaps. In a forward contract, one party agrees to buy an asset from another party at a predetermined price at some point in the future. No cash is required initially, and the contract is executed on the specified date at the agreed upon price. In the case of a commercial real estate forward, the buyer (long position) would agree to pay an agreed-upon price, or return on a commercial real estate index at a point in the future, to the seller (short position). The change in the value of the index determines the value of the forward contract at the settlement date. For example, in a typical equity index forward, two parties today agree to a forward price of \$100 for an index one year from now. If at the settlement date in one year the index has risen to \$110, the long position nets \$10, the difference between the index and the forward price.



In a swap contract, three parties typically participate in a trade. A notional amount upon which to calculate returns is chosen (e.g. \$100 million), but no cash is exchanged up front. The long position receives returns on the underlying index and pays LIBOR plus a spread (i.e. the bid price). The short position pays the returns on the underlying index and receives LIBOR plus a spread smaller than the bid (i.e. the ask price). Each party goes through an intermediary, a broker who matches the two positions and executes the contract. In exchange, the intermediary collects a fee equivalent to the bid-ask spread between the long and short positions. The swap is settled, or marked-to-market, each period (usually quarterly) with a net payment from the party on the negative side of the swap (i.e. the payment is higher than the receipt) to the party on the positive side of the swap.



PRICING

There are two components of investor returns that are relevant to pricing any derivative – 1) a risk-free return on the invested principal and 2) a spread (i.e. a risk premium) for taking on the risk of the referenced index. In a basic real estate forward or swap contract, the fixed payment component usually references LIBOR, and LIBOR is the risk-free return

that an investor requires as minimum compensation for their funds. In pricing a real estate forward contract, David Geltner of MIT and Jeffrey Fisher of Indiana University^{viii} propose that in equilibrium (i.e. efficient markets) the price of a real estate swap is equal to LIBOR. The rationale is that an investor is guaranteed a certain price or cash flow at some point in the future. Therefore, this risk-free cash transaction must be priced at the risk-free rate when markets are in equilibrium. The investor is willing to pay the expected return on the referenced index less a risk premium spread above the risk-free rate. Thus, the investor is willing to pay LIBOR.

$$\text{Expected Index Return} - \text{Risk Premium} = \text{Risk-Free Rate (LIBOR)}$$

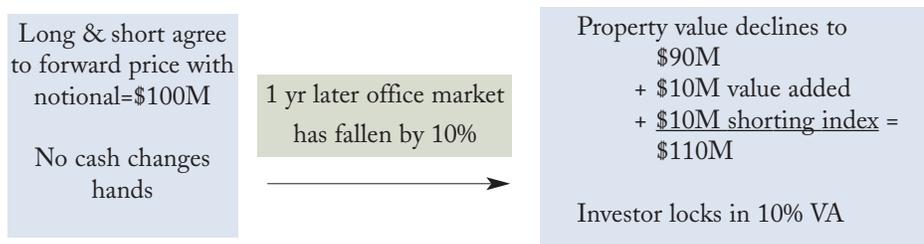
However, markets fluctuate and indexes are often not in equilibrium. Moreover, similar to stock and bond prices, many other factors come into play in pricing assets, such as tax considerations, differing market expectations among investors, liquidity preferences, and so forth. As a result, the bid and ask prices vary among investors, and spreads on LIBOR are adjusted accordingly.

BENEFITS AND USES OF REAL ESTATE DERIVATIVES

There are several benefits of, and uses for, real estate derivatives, which are useful tools for hedging and managing risk and managing portfolio returns. The following examples illustrate uses of commercial real estate derivatives.

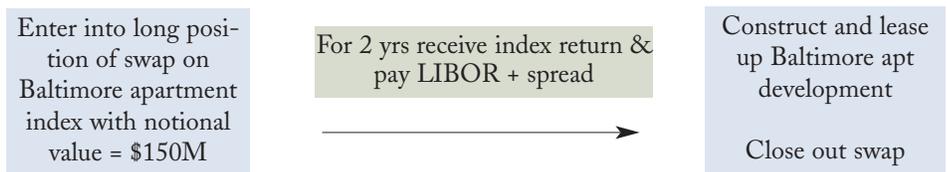
Risk Management

Derivatives can be used to lock in “alpha”, or the value that an investor uniquely adds to an investment, by hedging “beta”, or market risk^{ix}. For example, suppose an investor specializes in renovating office buildings in San Francisco and is talented at turning around properties. Typically the investor can add 10% to the value of a property. However, if the investor believes that the local office market is about to soften, there would be less incentive to take on a new project that could potentially lose value during a lengthy renovation period. To mitigate the local market risk, the investor could sell short a San Francisco office market index with the notional amount equal to the cost of the acquired property (e.g. assume \$100 million purchase price) and buy the property, effectively purchasing insurance against declines in the San Francisco office market. If one year later the investor is ready to dispose of the property and the San Francisco office market did indeed deteriorate, the investor will have eliminated local market risk and locked in alpha.



Quick Market Entry

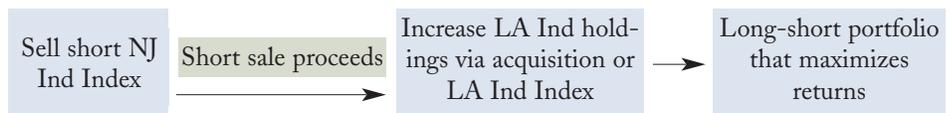
Another use of commercial real estate derivatives is to gain exposure to a particular market in less time than it takes to acquire property in that market.^x For example, suppose an investor believes the Baltimore apartment market is a good market in which to gain real estate exposure and is interested in a new development project. However, the project will take two years to complete and lease up. Using a derivative, the investor could gain immediate exposure to market gains by entering into the long position of a two-year swap with the notional amount equal to the cost of the development (i.e. the amount to be invested in the Baltimore apartment market). No cash is exchanged up front, and the contract is settled each quarter. At the end of two years, the investor will have benefited from market gains during the length of the development.



Similarly, derivatives can be used to fill the gap in funding when investing a client commitment. Capital allocations to commercial real estate typically take a long period to become fully invested as acquisitions are sought out and due diligence is performed. As illustrated above, derivative contracts provide a vehicle for full investment from day one as investments in real property are being implemented.

Portfolio Optimization

Derivatives are useful tools to maximize portfolio returns. In an equity investment portfolio, short selling a stock provides additional funds to be invested in stocks with higher expected risk-adjusted returns. This “long-short” strategy allows an investor to profit from poorly performing stocks, as well as solidly performing stocks, and to maximize portfolio returns (i.e. optimize the portfolio). Similarly, commercial real estate portfolio investment returns could be enhanced with short selling opportunities.^{xi} For example, suppose a portfolio manager specializes in industrial property investments throughout the U.S. and is adept at recognizing turning points (i.e. troughs and peaks) in warehouse markets. The manager is interested in increasing the portfolio’s holdings in the Los Angeles market, and at the same time, believes that the New Jersey industrial market is going to deteriorate over the next several years. The manager could sell short a New Jersey industrial market index and use the proceeds to increase the portfolio’s weight in the Los Angeles industrial market, thereby profiting from both the long and short positions.



Synthetic Portfolio Re-Balancing

Derivatives allow an investor to quickly increase or decrease exposure to commercial real estate without buying or selling the underlying real estate. For example, a significant decline in stocks or bonds may cause a portfolio to be overallocated in real estate. Rather than selling off properties that are performing well, the portfolio could be synthetically

rebalanced by using real estate derivatives to reduce exposure to the asset class^{xii}.

Obtaining Index Characteristics

Another benefit of real estate derivatives is that an investor can more easily add to a portfolio the same risk and volatility as a desired real estate index, as well as that index's low correlation with other assets in the portfolio. For example, it is impossible for an investor to obtain the identical risk, volatility and correlation as the NCREIF Index (NPI) without owning all of the underlying properties. However, with real estate derivatives, an investor can obtain the characteristics of the NPI by entering into a swap or purchasing or selling a futures contract on the index.

Increased Liquidity & Lower Costs

Similarly, real estate derivatives allow an investor to obtain the yield, volatility and correlation of a particular real estate market or property type without the cost of acquiring or managing the underlying property, resulting in lower upfront costs and lower management fees. These lower costs particularly appeal to smaller investors without the resources to invest in commercial properties. Derivatives also offer greater liquidity than holding commercial property within a portfolio, facilitating quicker execution into and out of investment holdings. This increased liquidity allows more frequent trading, enhancing price discovery and risk-return transparency for the asset class as a whole.

Increased Allocation to Real Estate

The ability to obtain the yield, volatility and correlation of real estate assets at lower costs and higher liquidity has important implications for investment portfolio allocations to real estate, particularly for pension funds. Historically, portfolio optimization dictates that real estate should comprise 10-20% of pension fund investment portfolios; however, typical pension funds have less than 10% of funds in the real estate asset class^{xiii}. Going forward, real estate derivatives may facilitate higher investment allocations to real estate as investors have cheaper and more liquid alternatives to solely investing in physical property.

That said, real estate derivatives cannot eliminate the need for direct investment in commercial property. Both derivatives and the indexes upon which their value is derived require robust property investment markets to exist. Moreover, many investors' investment needs dictate a preference for real assets. Derivatives should not be seen as a replacement for investment in real property assets but as an additional tool to be incorporated into a portfolio management strategy to maximize investment returns.

RISKS AND INVESTOR CONCERNS

As the market for real estate derivatives continues to develop, some investor concerns remain that must be addressed if these newly developed instruments are going to continue to evolve. A survey of potential real estate derivatives investors such as investment managers, fund managers, commercial lenders and brokers was conducted by the MIT Center for Real Estate in conjunction with Credit Suisse^{xiv} to identify these concerns, some of which are discussed below.

Illiquidity

The most obvious and greatest concern of potential investors is the lack of liquidity in the

Exhibit 4

Benefits of / Uses for RE Derivatives

Lock in alpha
Hedge beta
Quick market entry & exit
Fill gap in client funding
Short selling
Portfolio rebalancing
Higher liquidity
Lower costs
Obtain risk, volatility, & correlation of real estate

real estate derivatives market today. Illiquidity is a characteristic of all newly forming financial markets. While investors may be interested in a market for real estate derivatives, no one wants to be the first to enter into a contract. Investors are also naturally concerned with the lack of a secondary market, which makes it difficult to unwind a position quickly. That said, selling off physical real estate assets is also a slow process. As more players enter the real estate derivatives market, liquidity will follow.

Finding Counterparties

Similar to illiquidity, another investor concern is finding counterparties. When entering a real estate swap or forward contract, both a long and short position must exist. For the moment, many of the banks involved in the early stages of trading real estate derivatives will take the opposite side of a contract for the sake of facilitating a market. Eventually, however, a well developed market with many players (i.e. a market with breadth and depth) will be required if a derivatives market is to flourish.

Speculation

Another investor concern is the effect of speculative trading by opportunistic parties that may use derivative instruments to make short-term bets on commercial real estate markets. Speculation can cause increased volatility in markets, potentially disrupting markets, and investors are often concerned that derivatives make it easier to form speculative positions^{xv}. Investors are also concerned with the potential effects that speculation may have on the valuation of the underlying properties within an index^{xvi}. Derivatives often act as indicators of future prices (i.e. whether investors think prices will rise or fall), thus potentially affecting prices of the physical assets upon which these derivative instruments' values are based.

Choosing an Index

One concern for investors is choosing an index that is a perfect hedge for their investment positions (i.e. an index that minimizes basis risk). As the market for these derivative instruments develops, several choices have surfaced as possibilities for the underlying indexes, each with their own advantages and disadvantages in providing an accurate, timely index for real estate derivatives in the U.S. Two types of indexes are currently available for commercial real estate derivatives, each with its own methodology for calculating returns: appraisal-based indexes and transaction-based indexes. Recent research by Jeffrey Fisher of Indiana University and David Geltner of MIT^{xvii} identifies the pros and cons of each index type which are discussed below.

The NCREIF Property Index (NPI) is the best known and most widely used appraisal-based index. In an appraisal-based index, the properties that comprise the index are appraised regularly (in the case of the NPI, quarterly) to determine the index periodic returns. This methodology intuitively makes sense in that it is similar to the way many real estate investment funds report returns. A disadvantage in using an appraisal-based index, however, is that reported returns exhibit "lag" in the data as not all properties in the index are appraised each quarter^{xviii}. This blend of past and current data reduces index volatility, but also delays movements in the index relative to movements in property market values.

Another disadvantage of appraisal-based indexes is that conducting valuations of the entire commercial property market in the U.S. is not feasible. Instead, an index is comprised of a small sample of properties that drive returns. The NPI in particular only tracks properties held by NCREIF members, a market share that represents 5-10% of the total investable commercial property market in the U.S. (or roughly 5,000 properties). Reflecting this, typical performance results for individual investors rarely mimic the risk and return characteristics of the index as a whole.

The second type of index is a transaction-based index, which usually employs a repeat-sales methodology. Repeat sales indexes track the change in sales price for properties that have been sold at least twice, a methodology already utilized to calculate residential housing price index returns. Several repeat sales indexes are currently available for commercial real estate derivatives trading. The MIT Center for Real Estate publishes one index in conjunction with Real Capital Analytics and Real Estate Analytics, LLC (REAL) called the Moody's/REAL Commercial Property Index (CPPI), as well as a Transaction-Based Index (TBI) of Institutional Commercial Property Investment Performance, that tracks sales of properties within the NCREIF Property Index. Repeat sales indexes typically employ standard data filters to ensure meaningful price comparisons. For example, in calculating index returns Moody's/REAL excludes "flipped" properties (all properties in the index must be held for more than 1.5 years), excessively old data (properties with first transactions before 1988), and properties that have significantly increased in rentable building area (greater than 10% increase from prior sale).

One advantage of a repeat sales index is that a greater number of properties are included in the calculation of index returns. For example, the CPPI attempts to track all commercial-property sales in the U.S. over \$2.5 million, a total of hundreds of hundreds of thousands of properties and several times the number of properties tracked by NCREIF. As a result, the CPPI may comprise a more representative sample of the investable U.S. commercial property universe. A disadvantage of transaction-based indexes is that reported returns exhibit volatility, or "noise", because valuations are reported as properties change

Exhibit 5

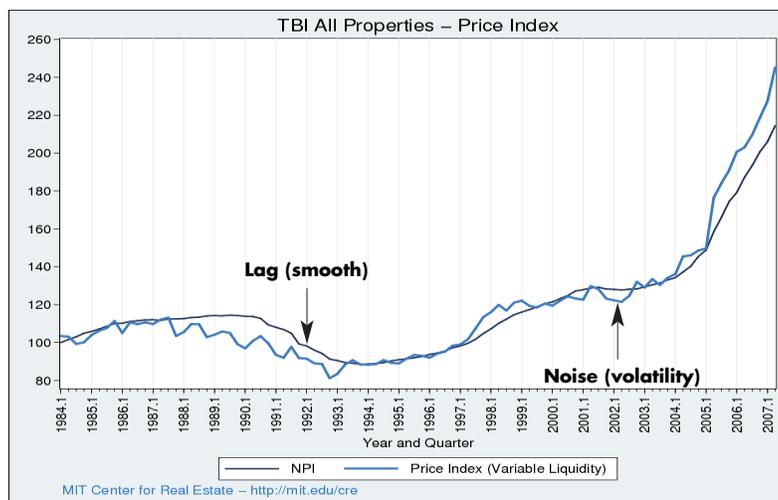


Exhibit 6**S&P/GRA Commercial Real Estate Index**

National	Regional
Office	Northeast
Warehouse	Midwest
Apartment	Mid-Atlantic South
Retail	Desert Mountain
Composite	Pacific West

Source: Standard & Poor's

Exhibit 7**Rexx Index Office Markets**

Atlanta	NY Midtown South
Boston	NY Downtown
Chicago	Miami
Dallas	Phoenix
Denver	San Francisco
Houston	Seattle
Los Angeles	Washington, D.C.
NY Midtown	Composite

Source: Cushman & Wakefield

Exhibit 8**RPX Residential Markets**

Atlanta	Milwaukee
Boston	New York
Chicago	Philadelphia
Charlotte	Phoenix
Cleveland	Sacramento
Columbus	Seattle
Detroit	San Francisco
Denver	San Diego
Jacksonville	San Jose
Los Angeles	St. Louis
Las Vegas	Tampa
Miami	Washington, D.C.
Minneapolis	Composite

Source: Radar Logic

hands, as opposed to appraisal-based indexes, which report smoothed returns^{xx}. This “lag” versus “noise” effect is illustrated below in a comparison of the NPI (appraisal-based index of NCREIF properties) and the TBI (transaction-based index of NCREIF properties).

Although appraisal-based indexes and transaction-based indexes vary in their advantages and disadvantages, there is no requirement for a single index to dominate. Many indexes may fulfill various investor needs, and competing indexes improve transparency and pricing. In addition to the indexes at MIT and REAL, new ventures are popping up to challenge the well-established NPI. For example, a new set of indexes has been jointly developed by Charles Schwab and Standard & Poor's with the Chicago Mercantile Exchange to offer futures and options. The S&P/GRA Commercial Real Estate Index, or SPCREX, is a set of 10 domestic transaction-based indexes segmented by geography and property type (Exhibit 6).

Rexx Index was also introduced recently, an office sector index jointly owned by Cushman & Wakefield and Newmark Knight Frank that reports quarterly returns for several office markets in the U.S. (Exhibit 7). In sum, multiple commercial real estate indexes are evolving and are vying for investor interest, a trend that bodes well for further development of the U.S. real estate derivatives market.

Other signs of continuing development for commercial real estate indexes are that derivatives markets are currently being formed for other real estate sectors such as residential real estate, the lodging industry, and public REITs. The Chicago Mercantile Exchange began listing futures and options contracts based on the Case-Shiller housing index and have recently expanded contract terms to 60 months. Radar Logic also recently began trading derivatives on its Residential Property Index (RPX), which tracks movements in housing prices per square foot based on residential real estate transactions in 25 metropolitan areas in the U.S. (Exhibit 8). Additionally, a newly formed lodging index, HQuant Lodging Index, measures average daily room rates of more than 48,000 hotel properties, or 68% of the U.S. lodging market. This index was formed through an agreement with Smith Travel Research for the purpose of trading derivatives. Finally, in the REIT sector, the Chicago Board of Trade launched a new futures contract based on the Dow Jones U.S. Real Estate Index, which is primarily comprised of REITs.

Inside Information and Owner Control of Underlying Properties

Related to choosing an index is the issue of inside information and ownership regarding the properties within an index. This issue exists for both appraisal-based and transaction-based indices. For an appraisal-based index, the owner of a property will likely know when a significant change in a property's value has occurred before the appraisal is released publicly. Similarly, for a transaction-based index, parties involved in an acquisition or disposition will know the transaction price before it is released publicly. These inside parties cannot be allowed to trade on this information prematurely. As a result, controls such as those used to regulate stock and bond markets must be implemented (or self-imposed) to ensure that all investors have equal access to data that influences index returns.

CONCLUSION

The development of a market for commercial property derivatives is a natural “next step” in the evolution of real estate investment from an extremely private and local market to a fully

the turbulent years of the real estate collapse of the early 1990s. From that period of distress, the modern REIT and CMBS markets emerged to radically change the way that real estate in the U.S. is held and financed. It is probably no coincidence that the growing interest in property derivatives is today occurring during a period of uncertainty and concern over the future prospects for the economy and property markets.

Going forward, growth of the real estate derivatives market has the potential to greatly benefit the commercial property investment community. Derivatives are useful instruments for managing risk, rebalancing and optimizing investment portfolios, as well as maximizing portfolio returns by facilitating short sales. Derivatives enhance real estate markets and real estate pricing by increasing liquidity and lowering costs; moreover, increased liquidity and lower management expenses may encourage investors to increase portfolio allocations to real estate. While real estate derivatives are still in a nascent stage in the U.S., the development and adoption of these instruments seems to be picking up steam. Several new indexes are being published for the purpose of creating derivative instruments. The investment banking industry is beginning to test the waters with a few trades, while other interested parties are taking steps to develop a market for real estate derivatives. For example, GFI Group is collaborating with CBRE Melody to offer a brokerage service for derivatives products based on both appraisal-based and transaction-based indexes. While many interested parties are involved in developing a market for real estate derivatives in the U.S. and enhancing liquidity, a major obstacle remaining is that the potential users of these products need to be convinced of the value of these instruments and the longevity of the market for these products. In September of 2007, an important step was made in this direction. To facilitate an exchange of information about real estate derivatives, a group of professionals interested in the industry recently formed an organization called Real Estate Derivatives Special Interest Group (RED-SIG), which is similar to the U.K. organization Property Derivatives Users Association. These professionals comprise an "advisory group" whose purpose is to educate and to field questions from interested parties on issues such as pricing and taxation of real estate derivatives. These developments all portend growing understanding and acceptance of derivative instruments in commercial property investing. If the REIT and CMBS markets are any indication, however, it may well take 5-10 years for this marketplace to fully emerge as a significant and dynamic component of U.S. institutional property investing.

Please feel free to contact Mike Acton, AEW's Director of Research (macton@aew.com or 617-261-9577) or Caroline Clapp (cclapp@aew.com or 617-261-9289) regarding any of the information contained herein.

ⁱRene M. Stulz, National Bureau of Economic Research. "Should We Fear Derivatives?" June 2004.

ⁱⁱJong Yoon Lim and Yi Zhang. "A Study on Real Estate Derivatives." September 2006.

ⁱⁱⁱJani Venter, CBRE Investors. *TortoWheaton Conference presentation.* Sep 28, 2007.

^{iv}Jennifer McCandless. "New Tools of the Trade." *Real Estate Forum*, July 2007.

^vPhil Barker, GFI Group/CBRE Melody. *TortoWheaton Conference presentation* Sep 28, 2007.

^{vi}Conversation with Jeremy Milim at GFI Group/CBRE Melody on October 18, 2007.

^{vii}David Geltner, MIT Center for Real Estate. *TortoWheaton Conference presentation.* Sep 28, 2007.

^{viii}David Geltner (MIT) & Jeffrey Fisher (Indiana U.). "Pricing and Index Considerations in Commercial Real Estate Derivatives." June 2007.

^{ix}David Geltner. "Transaction Price Indexes and Derivatives: A Revolution in the Real-Estate Investment Industry?" *Research Review*, Vol. 14, No. 1, 2007.

^xJim Clayton, Pension Real Estate Association. "Commercial Real Estate Derivatives: They're Here... Well, Almost." *PREA Quarterly*, Winter 2007.

^{xi}Jong Yoon Lim and Yi Zhang. "A Study on Real Estate Derivatives." September 2006.

^{xii}Jim Clayton, Pension Real Estate Association. "Commercial Real Estate Derivatives: They're Here... Well, Almost." *PREA Quarterly*, Winter 2007.

^{xiii}Elaine M. Worzala. "Real Estate Asset Allocation and The Decision-Making Framework Used by Pension Fund Managers." *Journal of Real Estate Portfolio Management*, 1997.

^{xiv}Jong Yoon Lim and Yi Zhang. "A Study on Real Estate Derivatives." September 2006.

^{xv}Rene M. Stulz, National Bureau of Economic Research. "Should We Fear Derivatives?" June 2004.

^{xvi}Jim Clayton, Pension Real Estate Association. "Commercial Real Estate Derivatives: The Developing U.S. Market." June 2007.

^{xvii}Jeffrey Fisher (Indiana U.) and David Geltner (MIT). "Indexes for Commercial Real Estate Derivatives." April 2007.

^{xviii}Jeffrey D. Fisher, Ph.D. "Introducing the NPI Based Derivative - New Strategies for Real Estate Investment and Risk Management."

^{xix}David Geltner. "Transaction Price Indexes and Derivatives: A Revolution in the Real-Estate Investment Industry?" *Research Review*, Vol. 14, No. 1, 2007.

^{xx}David Geltner & Henry Pollakowski (MIT). "A Set of Indexes for Trading Commercial Real Estate Based on the Real Capital Analytics Transaction Prices Database." December 15, 2006.



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