Real Estate Derivatives: Products and Prospects

by

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Submitted to the Program in Real Estate Development in Conjunction with the Center for Real Estate in Partial Fulfillment of the Requirements for the Degree of Master of Science in Real Estate Development

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ABSTRACT

The paper reviews the development, structure and trade of past real estate equity hedging instruments. The reviewed products represent a wide array of real estate derivatives, covering multiple property types, index methodologies and trading domains. Based on a series of interviews with leading product developers, market makers, traders and scholars, the paper examines and defines the unique features of the different products and analyzes their value proposition, market conditions and performance.

In order to gain an overall perspective on the prospects of real estate derivatives, the paper discusses types of market demand for real estate investing and hedging. In this context, we present real estate debt hedging instruments and compare their trade and use with past real estate equity products. In addition, we discuss recent regulatory acts and their influence on trading requirements and costs, market making and players as well as market efficiency.

In the last chapter, the paper presents Pure Property, a current real estate hedging solution, marketed by NAREIT and FTSE. We research Pure Property and compare it to past products. The paper points on Pure Property's new concept and its implications on asset valuation, product functionality and trading liquidity. The paper studies the ETF structure of the product and its contribution to arbitrage activity. For the abovementioned advantages, the paper predicts that Pure Property is likely to establish a liquid, real estate hedging market.

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Second, the thesis is based on a series of interviews with a dozen of industry leaders and insiders. Their highly valuable market insight as well as their open and sharing approach encouraged me to keep enquiring and searching for sound analysis and valid predictions.

And last but not least, I would like to thank my beloved wife, Tamara, whose constant love and care light up my life.

1. Introduction

The purpose of this chapter is to let the reader be aware of some of the dynamics that "set the stage" for the emergence of real estate derivatives.

In the last generation, institutional investors have been increasingly following the principles of modern portfolio theory (MPT), investing in multiple, non-correlated asset classes to maximize portfolio's risk-adjusted returns. In order to assure their ability to provide, under changing market conditions, scheduled cash flows to savers (pension, life insurance etc.), institutional investors developed advanced risk management systems which monitor and calculate the expected portfolio's *value* and *liquidity* at any given risk.

Based on these calculations, the portfolio manager can adjust portfolio holdings to control risk to the level dictated by the investment policy of the fund. A common and inexpensive way to address portfolio risks is by purchasing "protections" or hedging instruments against a specific portfolio risks.

For example: a portfolio with major holdings in Japanese firms has an exposure to the Japanese Yen (currency risk.) If the portfolio manager wants to mitigate the currency risk and still maintain his investments in those firms, he can buy financial instruments that hedge from a decline in the value of the Yen. Such hedging instruments could be formed as options, forwards, futures or swaps etc. They are called *derivatives*, as they derive their value from the value of another asset class.

As of the end of 2011, U.S. total investable wealth stood at $78 trillion dollars. While capital markets products (mainly bonds and stocks,) were roughly two thirds of the total investable wealth, residential and commercial real estate represented close to a third of this universe.

From an institutional investor's perspective, these two asset types are strikingly different. Whereas stocks and bonds are traded on an exchange, have a "market" price, and are largely liquid, properties are usually traded individually, have a unique price, and are largely illiquid.

Although many investors recognize the long term benefits of investment in real estate (steady cash flows, low correlation with capital markets etc.), there are some concerns about *liquidity* risks associated with investment in "hard assets". Moreover, since each property is unique and not traded on an exchange, traditional risk-management tools which measure *value* at risk (VAR), might not be applicable for real estate.

Also, commercial banks and other lenders, which need to calculate their *credit risks*, might have difficulties analyzing their real estate debt exposure, using tools developed for liquid financial instruments.

In the next chapter, we will review several attempts to establish reliable property *indices* to reflect housing and commercial real estate price movements. These indices served as a basis for different sorts of synthetic property derivatives. These derivatives were designed to allow investors to get standardized, liquid real estate exposures, and so, offer a solution for the abovementioned issues with real estate investing and risk management. We will survey the various hedging products, the markets they were traded on, prominent players and business performance.

In chapter 3, we will discuss existing *alternatives* for property derivatives. We will present real estate *debt* derivatives and discuss their features. In addition, we will investigate recent regulatory acts in the field of structured finance and explore the potential implications on the development of future real estate hedging tools.

In chapter 4, we will present Pure Property, a new liquid commercial real estate derivative. By comparing Pure Property to the past products, we will assess Pure Property's special characteristics and attempt to evaluate its prospects. Then, we will point on the product's special ETF structure and discuss its possible effect on the financial and business objectives of Pure Property.

In chapter 5 we will summarize our work.

2. Past Products

2.1 Residential

During the 2000's, there were several (both US and non-US based) attempts to create, monitor and run residential real estate derivatives products. Due to the scope of this research we are not able to cover all of these attempts. However, we will focus on a number of major products, innovations and methods in the field. The following products feature significantly different pricing methodologies, trading platforms, scale, financial instruments and players. As we observe in the next chapters, the difference in products reflects a deeper variance in the products' hedging and purpose perception.

2.1.1 Radar Logic (RPX)

Radar Logic is a technology-driven data and analytics business that produces a daily "spot" price for residential real estate in (25) major U.S. metropolitan areas. Radar logic's research allows the development and trading of financial derivative instruments. Based on its "spot" price (proxy) and several layers of data processing, Radar Logic provides the Residential Property Index and the tools and support needed for Residential Property Index (RPX) derivatives market.

The Radar Logic Daily price is a single value representing *the price per square foot* paid for residential real estate in a defined metropolitan statistical area (MSA) on any given day. Data are gathered from *public source records* (such as titles, municipalities etc.) and then processed by a proprietary (patent pending) algorithms into an index, reflecting the values paid in actual real estate transactions.

2.1.1.1 Index Methodology and Innovation

Radar Logic chose a transaction-based index over an appraisal based index, because it reduces "smoothing" effects and appraisers' biases. These biases are typical for proxies that use data given by mediators (appraisers, brokers etc.) and therefore tend not to be reflective of the full range of the market activity. As a result, these data may provide a vaguer and less accurate picture of the market. On the contrary, transaction-based indices are making use of much broader data bases, comprised of virtually all entries (deals) recorded.

Taking the transaction-based approach was not an easy task for several reasons:

The granularity of data offers higher likelihood to result a better observation of the market, but also poses a substantial hurdle on both data mining and processing. For example, considering the natural seasonality of the housing market demands a special care in the index production. Moreover, volume is highly sensitive to both, location (the exact neighborhood demographics) and price (more transactions are taking place in a "hot" market). Since volume means more data points in the "pool", there is a risk that the index will be overly influenced by the "hotter" markets. Therefore, to realize the actual state of the market, one has to control for these factors.

In addition, real estate, and particularly, the housing market is a non-commodity product. Each unit's (house) value represents various measures (size, location, quality of building, amenities, age, maintenance etc.). While some of the measures can be standardized, others are almost impossible to be quantified. Here too, Radar Logic faced a significant challenge.

Radar Logic's index addressed the abovementioned challenges in number of ways:

First, RPX is a "full information" index. The index is comprised of *all* recorded transactions for *every* specific *location*. The sampling is done on a *square-foot basis*, to control for size and new space variance. To avoid outliers' and seasonal effects, the firm is comparing *distributions* and patterns of price per square foot over time. By examining distributions and not (medians, averages or ranges of) price, Radar Logic is able to distinguish trends from seasonal noise and formulate a *relative price index*.

Second, the focus on the *shape* of the market provides a better understanding of the entire *housing space market*, regardless of the individual characteristics of the actual transacted homes. Since the focus is on market's distribution and shape, the volume effect, (more transaction taking place in some regions or price ranges) is mitigated by looking at the distribution of prices across price levels and regions (at least to the extent there are enough data points to get a comprehensive curve).

At last, the firm applies three sampling periods (1 day, 7 days and 21 days) in its research. The 3-period sampling procedure allows higher level of confidence in the Radar Logic's methodology and validates the accuracy of the RPX.

Despite the prominent improvements in Radar Logic's approach, it is, however, close to impossible to control for another imminent weakness.

Transaction-based housing data is available through public sources, and therefore publication time *lags* the underlying price. According to Radar Logic, this lag is limited to 63 days (maximal delay in housing transaction records). For obvious reasons, a time-lag is inherent to any transaction-based proxy.

Nevertheless, by clarifying to the users/customers of the index the natural delay in the proxy, the firm lessens some of this problem. In a similar way to any other information-derived product, processing-time is inevitable. Raising transparency and open communication with clients, contribute to a more accurate perception of the product and its limits.

2.1.1.2 History

Andrew Hecht, a commodity trader, founded the company under the name Global Skyline, in 2003. Soon after, Michael Fedar, formerly a banker at Credit Suisse, joined the firm.

The original motivation derived from an emerging derivatives market, in which "exotic" or "esoteric" products were booming. The demand for real estate derivatives seemed very natural to *financial players* (including the founders themselves), as real estate represents such a major share of total global wealth.

Also in 2003, Global Skyline filed U.S. patents, covering the intellectual property associated with producing and utilizing daily real estate prices in derivative financial instruments and markets.

In 2006, the company initiated partnership with Ventana Systems, an algorithmic-driven research firm, to jointly develop the daily real estate price index. In addition, Global Skyline completed a private equity placement and changed its name to Radar Logic.

In 2007, Radar Logic started the publication of the Radar Logic Daily Prices for residential real estate. In addition, Radar Logic merged with Ventana Systems, which continued to operate as an autonomous subsidiary of Radar Logic.

Later that year, trading began in Radar Logic's Residential Property Index (RPX) market. RPX volume exceeded **$0.25B** in its first 7 weeks of trading. Radar Logic also began the publication of RPX Monthly Housing Market Report.

In 2008, trading in Radar Logic's RPX exceeded **$2B** in volume. Radar Logic introduced the RPX Manhattan Condominium Price and RPX Manhattan Neighborhoods indices.

Index quality was recognized by the U.S. Department of Housing and Urban Development, which began using Radar Logic as a source for determining median home prices as part of the Economic Stimulus Act of 2008.

In 2009, during one of the most difficult periods in the history of US real estate markets, trading in RPX reached close to **$4B** in volume.

In 2012, the firm registered RPXC, RPX-based future contracts, on the Chicago Board Options Exchange (CBOE). Actual RPXC trading volumes were extremely low (estimated at no more than $40M notional value, annually).

2.1.1.3 Product and Market Making

Over the years 2003-2006, the firm developed its methodology and business strategy.

In 2007, when the Daily Price Index (RPX) was released, Radar Logic introduced a total-return swap based on RPX. The swap was over-the counter (OTC) product, marketed and traded by 7 banks: Goldman Sachs, JPMorgan, Lehman Brothers, Merrill Lynch, Morgan Stanley, Deutsche Bank and UBS.

Over-the-counter (OTC) trading is done directly between two parties, without any supervision of an exchange. In an OTC trade, the price is not necessarily made public information.

Typically, investment banks (market makers) are involved in the structuring and pricing of the deal. Investment banks can link between the two or more parties to the deal ("off balance" transaction) for a fee, or participate as a party to the deal ("on balance" transaction).In some cases, the bank takes a "side" in a deal ("on balance") and then sell parts (slicing and repackaging) or all of his position to a third party for a profit. This pattern exposes the deal players to a counter-party risk, as it is frequently not clear who they trade with.

According to sources in the market, typical trades were at about $10M-20M (notional value). Radar Logic reported a daily price quote to market makers and was paid a monthly fee, calculated as a percentage of notional value traded.

Almost all of RPX traders were believed to be financial speculators, rather than "natural" risk managers/hedgers. Due to the nature of OTC trading, a large share of the trades was placed by banks themselves and there was no transparency regarding the ask/bid spreads.

Market insiders report that Phoenix, Los Angeles and Miami MSA were among the most liquid swaps. Not surprisingly, these MSA attracted large activity of condo flippers, causing high volatility in the market, driven by investors/traders rather than consumers. The interest in the swaps was in-line with investors' interest in the underlying markets.

The collapse in housing prices in the last quarter of 2008 and beginning of 2009, caught "longers" (derivatives investors who bet on rising housing prices) in a vulnerable position. Since total return swaps didn't require high margin and significant collateral, most "longers" were exposed to a large "naked" liability (a position where investor's financial liability is greater than the actual capital deployed in the transaction). As pressure on traders grew, market makers urged clients to settle their liabilities. Consequently, in the *first quarter of 2009*, when housing derivatives experienced their largest losses, RPX market attracted the *highest* volume of trading.

According to market insiders, OTC settlements usually include an offsetting swap contract. The offsetting is done by the market maker who originally sold the losing contract and now structures a position that is accurately opposite to the original trade taken by the trader.

By writing a contrasting contract, both sides of the deal can lock their profit/loss and avoid additional uncertainty-risk. While swap settlements are completely optional, OTC market makers tend to offer such trades as part of a long-term relationship with investors.

Since 2009 settlements were done under historically distressed conditions, banks could take advantage of their informational advantage and buy from their clients RPX "longs" (swaps benefitting from housing price recovery) at record-low prices. The "longs" bargain reflected both swaps *market price markdowns* (due to the collapse in US home prices) as well as a very *wide, ask/bid spread*. Sources in the market believe that Goldman Sachs was a main beneficiary of RPX swaps settlement trading.

However, the settlements of "first generation" RPX swaps signaled the *end* of the total-return RPX swaps market. Public negative sentiment towards structured finance, strict regulatory acts, weak underlying housing market as well as other factors (discussed in detail in chapter 3), practically shut down the RPX derivatives market.

As a result, post crisis, Radar Logic focused on developing its research products (including the very RPX index that served for constructing the RPX swaps), rather than trading tools.

In 2012, in a new attempt to revive housing derivatives market, Radar Logic registered RPX futures on the Chicago Board Options Exchange (CBOE). This move denoted couple of substantial transformations in both, the product and the market.

Regulatory acts take an increasingly important role in the trade of financial products. Historically, OTC trading was very loosely regulated, attracting prominent investment banks and other sophisticated financial players who believed they would be able to take advantage of the inefficient "market" to make abnormal returns. However, the financial crisis emphasizing the risks of non-transparent markets (counter party risks, fraudulent financial behavior etc.,) as well as global media coverage and public concerns, led regulators to scrutinize these markets and to enact a series of reforms in the OTC arena.

As a result, *currently*, OTC products experience stricter regulatory treatment than exchange-traded products. According to prominent traders who oversee large alternative investment and trading operations, the stricter regulation led to shrinking trading volumes across all derivatives, and had a critical effect on "esoteric" derivatives (derivatives that are based on illiquid underlying assets).

On the one hand, by structuring RPX derivatives as future contracts, rather than total-return swaps, the firm avoided some of the current regulations (margin, compliance etc.) relating only to OTC (private) derivatives and not to exchange-traded (public) securities.

On the other hand, in terms of value representation, Radar Logic was still able to restore the total-return swaps *economic value* in the form of futures. It is possible to accomplish the same type of hedging and synthetic investment, using futures contracts as using total return swaps. Therefore, futures could have both, an equivalent economic value and the same financial function of total return swaps.

In spite of the significant transformations in product and trading domain, since inception in 2012, trading volumes in second-generation RPX futures have been very low.

Exchange-traded instruments are being marketed by a prime broker and Radar Logic hired Barclays as its RPXC's prime broker.

According to some industry insiders, Barclays did not see much of potential in the product, and that in turn, might put another hurdle on the potential revival of the RPX market.

Since most RPXC investors are financial speculator, they tend to similarly anticipate the market direction (unlike hedgers, who have a "natural" different hedging demand, based on their portfolio). As a result, to realize a balanced, well-functioning market, there is a need for a sophisticated counter party, which can identify and react to market consensus, price the derivatives accordingly, and *trade against* most players.

Some analysts argue that having a prime broker marketing its exchange-traded Radar Logic's products is the reason for the RPXC failure.

Since the prime broker (Barclays) is not allowed (for regulatory reasons) to place his own trades, the likelihood of the RPXC to become an *efficient* market is lower. According to these views, only a *financially involved* player (like an OTC market-maker) who is well incentivized to take a position "on his balance sheet" (by active participation in other players' trades) is likely to provide enough liquidity to transform this not-balanced, illiquid market to a liquid one. Such an active market maker is legally possible only in OTC (private) markets. Nevertheless, recent regulation regarding banks proprietary trading puts this possibility under question. We will discuss this argument in chapter 3.

2.1.2. S&P Case Shiller (CSI)

The S&P/Case-Shiller Home Price Indices are designed to measure the *average change* in home prices in a particular geographic market in the U.S. They are *calculated monthly* and cover 20 major metropolitan areas (MSA), which are also aggregated to form 2 composites: One comprises 10 of the metro areas and the other comprises all 20.

The S&P/Case-Shiller U.S. *National* Home Price Index tracks the value of single-family housing within the U.S. The index is a *composite* of single-family home price indices and is *calculated quarterly*.

The CSI *futures* enable to trade U.S. housing values in a centralized marketplace. The futures are traded on the Chicago Mercantile Exchange (CME) and cover 10 different cities: Boston, Chicago, Denver, Las Vegas, Los Angeles, Miami, New York, San Diego, San Francisco and Washington D.C. In addition, a national composite index of all 10 cities is also traded on the CME.

2.1.2.1. Index Methodology and Innovation

The Home Price Indices originated in the 1980s by Case Shiller Weiss's research principals, Karl E. Case, Robert J. Shiller. At the time, Case and Shiller developed the *repeat sales* pricing technique. This methodology was later recognized as a reliable way to measure housing price movements. It is also used by other index publishers, including the Office of Federal Housing Enterprise Oversight (OFHEO).

The Case Shiller indices do not sample sale prices associated with new construction, condominiums, co-ops/apartments, multi-family dwellings, or other properties that cannot be identified as single-family. This policy is based on the observation that the factors which determine housing values (supply pool, financing, investor involvement in the market, etc.) are not the same across different types of properties. In addition, the relative sales volumes across different property types fluctuate dissimilarly, so *housing* indices will more accurately track housing values.

According to the Case Shiller method, the indices are calculated on a monthly basis, using a 3-month *moving average* algorithm. Home sales pairs are accumulated in rolling 3-month periods, on which the repeat sales methodology (see below) is applied.

Data are collected on transactions of all residential properties during the months in question. The main variable used for index calculation is the *price change between two arms-length sales* of the same single-family home. Home price data are gathered after that information becomes publicly available at local recording offices across the country. Available data usually consist of the address for a specific property, the sale date, the transaction price, the property type. In some cases, data also include the seller's and/or purchaser's names, as well as the mortgage amount.

For each home sale transaction, a search is conducted to find information regarding any previous sale for the same home. If an earlier transaction is found, the two transactions are paired and are considered a "*repeat sale*." Sales pairs are designed to yield the price change for the same house, while holding the quality and size of each house constant.

Moreover, since the sampling period is spread to 3-months, the database can overcome delays that might occur in the flow of homes price data (usually a result of a municipal records publication delay).

Following the data collection, transactions with prices which do not reflect market values are excluded. For example, changes in property's type/zoning (conversion from one asset class to another), or modifications to the *physical* characteristics of the property are specifically excluded from the calculations. Typically, municipal records can provide an indication regarding these variations.

In addition, repeat sales reflecting *extreme value* movements are suspected to be unrealistic and not included in the composites' calculations. Another exclusion from the indices regards to high turnover frequency. In case a house is traded twice within 6-months period, its price data will not be considered for the index construction. The reason for this policy is the high probability of either major redevelopment of the asset or fraudulent behavior of some of the transaction participants.

As a result of the abovementioned screens, indices are capable of tracking prices given a *constant* level of *quality*, because of the repeat sales methodology (price change of the *same* house), while controlling for physical or zoning variation). As long as sampling pool is *large* enough, it can provide a reliable index derived from a *meaningful* price change averages.

In contrast to Radar Logic's RPX which attempts to track the *entire* (full information index) market based on *price distribution* analysis, Case Shiller tracks a *filtered* (repeat sales transactions combined with exclusions mentioned above) pool based on a *relative price change* basis.

Not surprisingly, the difference in methodology is well reflected in the index behavior. The chart below shows the national CSI and RPX indices performance in the years 2000-2012:

Both indices cover the same universe, the US housing market, and behave correspondingly. Nevertheless, while RPX, based on "full information", has a choppy curve, the use of filtered-repeat sales method leads CSI to a visible, more stream-lined curve.

In a similar way to RPX, open communication and transparency with clients and investors help to mitigate the problematic information delay (approximately three months), which is inherent to the index.

As the Case Shiller indices focus on regional proxies (MSA), each sales pair is aggregated with all other sales pairs found in a particular MSA to create the MSA-level index. The 10 and 20 Metro Area Indices are then combined, using a market-weighted average, to create the Composite of 10 and the Composite of 20.

2.1.2.2. History

The foundations of the Case Shiller indices go back to the 1980s. In the early 1980s, the economists Karl E. Case of Wellesley College and Robert J. Shiller of Yale University worked on a method for comparing repeat sales of the same homes in an effort to study home pricing trends. The original goal was to analyze price movements in the Boston area, which was going through a housing price boom at that time.

Case argued that the Boston's housing boom was unmaintainable, but not a bubble. In order to prove his conviction, he asked Shiller, a behavioral finance expert, to join his research. Following the work on the Boston index, they formed more repeat-sales indices for other cities across the country.

In 1991, Allen Weiss, a graduate student of Prof. Shiller at Yale, persuaded both Shiller and Case to form a company (Case Shiller Weiss) that will produce the indices periodically and provide information to the market.

In 2002, Fiserv, a financial services company, bought Case Shiller Weiss. With Standard & Poor's, they developed derivatives that are based on the Case Shiller indices, the *CSI*.

In May 2006, Case-Schiller Home Price Index *future contracts* started trading on the Chicago Mercantile Exchange (CME). Case Shiller also initiated *options* trading on the exchange, however, the very low futures volumes put heavy pressure on this activity.

In April 2013, Core Logic, a financial and real estate research firm, acquired the Case Shiller Weiss business from Fiserv.

As of today, The Case Shiller indices are generated and published under agreements between S&P Dow Jones Indices, Core Logic and Macro Markets (an investment management firm founded by Prof. Robert Shiller and Samuel Masucci).

2.1.2.3. Product and Market Making

Case-Shiller selected futures traded on an exchange, as its housing derivative. This is opposite to the (original) over-the-counter trade of Radar Logic's RPX.

Market maker for the CSI futures is John Dolan, who also runs HomePriceFutures.com, a website dedicated solely to CSI derivatives.

There are number of advantages in exchange traded derivatives, we will attempt to examine their viability in regard to CSI.

Transparency – Futures and options traded on an exchange allow full transparency to all market-players. In various exchange markets (bonds, stocks), transparency regarding supply, demand, clearing and volumes is a crucial factor for the participation of retail and small investors, as well as other "non-sophisticated" traders in the market.

However, esoteric derivative markets demand a broader financial skillset at the product-level. Moreover, the nature of the product provides *exposure* to a specific niche and usually attracts either players driven by "natural" hedging demand or speculators. Therefore, even with an open access to market information, it is questionable how much of a "non-sophisticated" activity is actually taking place.

Product type and counter-party risk – Typically, OTC "individualized" products entail a greater counter-party risk than plain vanilla exchange securities. For example, a buyer of RPX total return swap is inevitably invested in the financial well-being of the current holder of the note (the other "side" or "seller") in the deal. This holder/"seller" buy the note from the market maker without notifying the buyer of the product. The buyer might find himself with a void swap or hedge in case the holder/"seller" is not able to settle it.

Exchange-traded products usually do not involve such an extreme uncertainty regarding the post-transaction counter-party risk. This is a result of the nature of the traded *product* rather than trading domain.

When a company issues equity, debt or derivatives, it has to regularly report its financial performance to the public. The company will also have to hire auditors to review its financial reports and give an update for any major event in the life of the company. The issuer firm is well-defined, transparent and regulated.

This is in contrast to individualized OTC products, which are neither transparent, nor regulated, and can be further sold (without the counter-party approval) to third parties with a different risk profile.

CSI, though structured like futures, demand a settlement on expiration day by the holder. The "underlying" asset is an information-based index. As such, only a mutual agreement of the actual holder-seller and holder-buyer to settle the future, on the expiration day, gives the future its value. Therefore, credit risk and counter party risk are *equivalent* to that of similar OTC products (RPX).

Regulation - As we will see in more detail in chapter 3, post financial crisis, regulators are concerned with investment banks risk management and monopoly in OTC trading. As a result, several restricting actions (Dodd-Frank etc.) are currently taking place. By marketing exchange-traded products, Case Shiller benefits from an *already* regulated and therefore more stable trading environment.

On the contrary, OTC market-makers (usually top-tier banks) are capable of and well incentivized to enhance liquidity and trading volumes of esoteric derivatives they market.

The banks frequently take a position in these products, and effectively price and clear *unbalanced* demand or supply.

As we witnessed in the RPXC case, real estate exchange-traded derivatives did not attract substantial volumes.

Moreover, a close look at CSI market data shows that even on a *relative* basis, CSI continues its decline. A comparison between monthly trading in 2007-2008 (pre-crisis) to 2011-2013, shows the market weakness over time:

Volume
Contracts Traded

	YTD			By Month		
	2011	2012	2013	2011	2012	2013
Jan	22	16	8	22	16	8
Feb	34	62	15	12	46	7
Mar	48	122	41	14	60	26
Apr	93	145	52	45	23	11
May	101	228	69*	8	83	17*
June	118	267		17	39	
July	138	277		20	10	
Aug	148	302		10	25	
Sept	157	317		9	15	
Oct	166	337		9	20	
Nov	168	339		2	2	
Dec	195	357		27	18	

To the left, on the right column, CSI monthly volumes as reported by the market maker, John Dolan, in May 2013.

Below, first 2 lines, CSI monthly volumes in March 2008, March 2007 and February 2008 as recorded by the CME and quoted by Quinn Eddins.

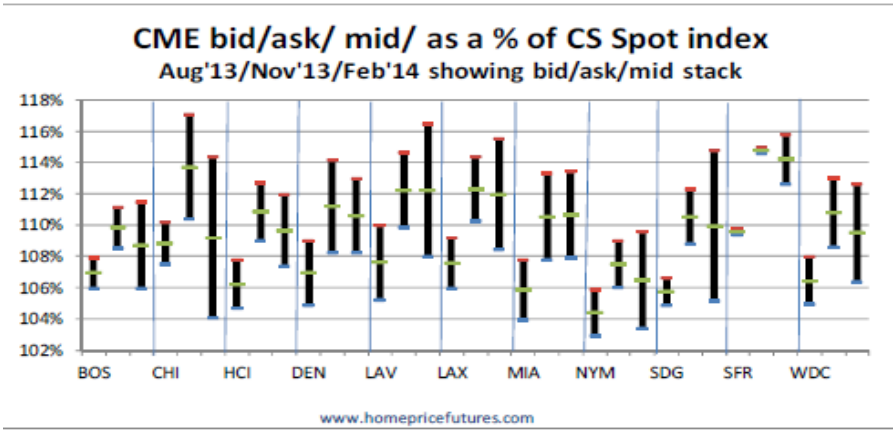
	March-08	Month Ago	Year Ago	% Change Month Ago	% Change Year Ago
Housing Futures	505	489	1,565	3.2	-67.8
Housing Options	414	414	1,924	---	78.5
Calls	84	84	610	---	86.3
Puts	330	330	1,314	---	74.9

Source: Chicago Mercantile Exchange, Quinn Eddins

A quick look at the two tables above indicates that CSI trading volumes experienced a sharp decline. In March 2007, 1,565 contracts (or total volume of roughly $400,000) exchanged hands. A year later, volumes were slashed by two thirds to about $130,000. In 2013, trading activity stood at approximately $6,500 and represented merely 1.6% (!) of 2007 volumes.

Low volumes strongly affect ask/bid spreads. The ask/bid spreads reflect the gap between buyers and sellers expectations. The larger the spread is the more difficult to "make" a market, as the market-maker has to carry a greater risk in "bridging" this gap. CSI spreads are so large, that official market maker, John Dolan, ceased to make a market and is currently focused on improving market research.

Below is a chart (created by John Dolan, published in his website: HomePriceFutures.com) detailing the ask/bid spread in three recent periods: August 2012, November 2012 and February 2013, across different regions (MSA).



Below is a snap-shot on the ask/bid spreads by region (MSA) and future expiration date (created by John Dolan, published in his website: HomePriceFutures.com). Green numbers are tightest spreads per expiration date. Red numbers are the widest spreads per expiration dates. In many later expiration contracts, no spread is available ("missing spreads")!

5/31/2013		BID-Ask $												
	Contract												Mar	Apr
		BOS	CHI	CUS	DEN	LAV	LAX	MIA	NYM	SDG	SFR	WDC	AVG	31	30
	K13													3.1	1.7
31-Aug-13	Q13	3.0	3.0	5.0	5.6	5.2	6.0	6.0	4.8	3.0	0.6	5.8	4.4	5.2	5.3
30-Nov-13	X13	4.0	7.4	6.0	8.0	5.2	7.6	8.6	4.8	5.8	0.6	8.4	6.0	5.4	4.4
28-Feb-14	G14	8.6	11.4	7.4	6.4	9.2	13.2	8.6	10.0	16.2	4.8	11.8	9.8	9.0	7.6
31-May-14	K14	15.0	10.0	8.6	13.8	14.6	24.8	14.4	13.6	19.0	21.0	18.8	15.8	8.0	6.2
31-Aug-14	K14	7.4	10.0	11.4			12.6	15.8	10.4		6.6		10.6	10.2	8.0
30-Nov-14	X14	8.0	14.6	7.0			15.0	15.0	7.6		8.0	15.0	11.3	7.9	6.7
31-May-15	K15			11.0									11.0	12.1	9.2
30-Nov-15	X15	10.8		9.8			19.0		9.4				12.3	10.3	8.1
31-May-16	K16			14.6									14.6		
30-Nov-16	X16			14.6									14.6	12.8	11.1
30-Nov-17	X17			17.8									17.8	16.3	13.6

The often *double-digit* ask/bid spreads are explained by Dolan as a result of market illiquidity, as well as one-sided position of market players.

2.1.3. Developers Initiative - 2009

In addition to RE derivatives reviewed previously, we would like to cover another *private* housing derivative. This product was structured by *developers*, active in the New England Region. As explained below, we find this initiative to be an important case study for a unique product that was driven by end users (having natural hedging demand.)

2.1.3.1. Derivative Homes - Background and Structure

During the "Big Recession", in the years 2008-2009, many developers found themselves with sizeable supply of condominium units in an environment of limited financing for home buyers and extremely low appetite for property investments.

Developers reacted differently to the crisis. While some, usually those with little leverage, were able to hold their built units (stock) in an expectation to better times, others were forced to cut prices and quickly liquidate stock.

Buyers had other difficulties on their end. Job security and salaries decreased, while unemployment rose. Additionally, Mortgage financing that is used in most purchases, became hard to reach, as banks posted higher mortgage requirements. At last, home prices were falling in double-digit rates across the country, and many buyers felt a house is not a "safe" investment anymore.

Since banks themselves suffered from over-leverage, they strived to *reduce* their exposure to the financing-heavy building sector. Developers could rarely get "fresh" (new) debt against their existing stock. The ultimate outcome was exceptionally harsh lending conditions for developers.

Few developers from New England were working on an alternative solution. They recognized a "perfect storm" affecting *all* market players, and tried to design a solution which addresses the abovementioned matters.

The idea was to sell the houses at an attractive below-market price, with a contract stipulation that leaves the potential future upside to the developer. The proposed contract was based on the following:

- The house is sold for a markdown of about -10% of the "actual" market price (as indicated by recent deals), and about -25% of pre-crisis prices.
- The buyer-resident owns the property and gets a right to use the property for 30-year period. The 30-year right is limited to the buyer and his immediate family. This *right* cannot be transferred, *for free*, to others.
- The buyer can decide to move out and sell the property. In case of death or sale within the 30-year period, the buyer loses his right to further live in the property.

- The developer-seller receives an immediate cash payment at the amount of the condo discounted price. In addition, he is entitled to receive the potential *profit* from the resale of the condo.
- When a resale occurs, if the resale price is higher than original purchase price, the original purchase sum, as adjusted by an annual 1% inflation, will be given to the buyer-resident. The resale will occur, at the latest, by the end of the 30-year period.
- The profit to the developer is calculated as follows: Resale price – (Purchase price * annual appreciation of 1%). 1% appreciation is historically lower than the inflation (CPI) rate, and therefore one can view it as a long-term advantage to the developer-seller.
- In case of a loss (downside), buyer-resident is not entitled to any reimbursement by the Seller-developer. The buyer will receive the 100% of the proceeds of the sale.

A close look at this structure reveals a discount that is given in exchange to a *call-option* (adjusted to a constant 1% appreciation) on the condo unit. The strike price is the original discounted price. The exercise date is variable, ranges from 0 to 30 years, and is controlled by nature (in case of resident's death) or the resident decision to move (sell).

The floating exercise date causes uncertainty about the option pricing. However, based on property type and target clients (old couples), developers believed buyers will likely live in the unit for an average of 8-10 years and then sell it.

Unlike a long-term lease, the buyer actually owns the property. The outcome is that the home buyer is entitled to receive his *original investment* (or less if the value goes down) when he decides to sell or at the end of the 30-year period, when the house is sold by the developer.

The contract also allows the developer-seller to *sell* the option to other investors, who are interested in buying exposure to the potential upside of the *specific* condo unit. Since the option can traded, we view it is as a *de-facto* housing derivative.

In a period of several weeks in early 2009, the developers were able to sell few of these structured units. Their success in introducing a new product under tough market conditions encouraged them to think about the commercialization of the product. The ultimate goal was to grow and scale developers-sellers' derivatives as a *hedging* tool to capture potential future upside in times of downturn.

Together with a well-experienced player in the real estate metrics world, they planned to *pool* coupons (or call options) of sold homes, and then sell *shares* in the pool to investors interested in securing potential housing upside. The shares in the pool represented proportional holding in the future payout of the pooled homes (driven by the delta between purchase price, as adjusted to inflation of 1% annually, and resale price). The commercialized product was diversified and less risky, as it had limited exposure to any individual property.

At this point the group of developers and their advisor encountered a major problem.

Buyers, who attempted to receive mortgages for these "structured" homes, were rejected by the banks. Banks opposition to the product was caused by Federal Housing Finance agencies (Fannie Mae, Freddie Mac and the Federal Home Loan Banks) home insurance policies. In general, federal agencies do not guarantee commercial properties financing. Additionally, although pure speculative *house* purchase should not be covered by the federal agencies, it is pretty hard to tell what the true intentions of a home buyer are. Therefore, even speculator homebuyers can benefit from the federal home insurance coverage.

Nevertheless, derivative-homes were "sliced" into two-pieces, the actual home-use right (sold to the home buyers) and the future resale upside (sold to investors). The two aspects of ownership are detailed in the house sale contract.

Banks were concerned that the complicated ownership structure would be perceived as a *financial* tool that provides a technique to capture home price inflation and will not pass the federal agencies screens for mortgage insurance.

Consequently, commercial banks were reluctant to provide mortgages to buyers of derivative-homes. The developers' initiative could not proceed without elementary house mortgages availability.

According to sources close to the matter, to handle that bureaucratic-legal hurdle, the developers and advisor approached Congressmen and other Washington policy makers, in order to pass a Congress Act designating the new derivative-homes as eligible for federal agencies guarantee. The main argument for such an Act was that by recognizing the new ownership structure as a legitimate alternative to an outright purchase, buyers would be able to get a more affordable housing solution. In addition, distressed developers could get access to another source of funding - the call options, without increasing banks' exposure to the homebuilders sector.

According to developers who were involved in the dealings with Congressmen, the complexity of the product as well as the general negative public opinion regarding structured financial products failed the Act. Developers were able to meet with several decision makers to discuss the matter, but according to people close to the initiative, they saw no success in passing a new Congress Act.

On a practical level, since commercialization of the product couldn't pass, developers who wanted to take advantage of derivative-homes had to convince both local banks and clients in the validity of the special contract stipulation. Sources report that they were able to obtain *one* local bank approval to finance derivative home buyers. The number of derivative homes actually sold is not clear. Different market players say there are no more than 20 of such homes.

2.1.3.2. Derivative Homes – Analysis

The ambitious effort of the New England developers during the financial crisis is important for several reasons:

First, the other housing derivatives reviewed in this chapter (CSI, RPX), do provide exposure to the housing market in different US regions, however, they are *synthetic products* as they are based on *information* indices.

On the contrary, the derivative-homes are based on an actual pool of houses, making their call options a "natural" product on an actual houses price. By structuring a natural product, the developers avoided some of the issues related to synthetic instruments, such as information lag, index reliability and counter-party risks.

Second, this group of developers was using hedging tools for what investment professionals call end users, having a natural demand for hedging. In the investments world, natural demand is a demand for a product, structure or solution that is driven by an existing need, caused by the investor's profile, characteristics or conditions.

For example, a pension fund portfolio manager typically seeks to normalize his returns. This will is based on the *nature* of the fund and its clients. The fund is responsible to prudently invest pension money and clients demand low risk-returns on their savings and stable retirement funds.

Therefore, it is no wonder that a pension fund portfolio manager will tend to make use of financial hedging tools that (for cost) help him mitigate risk (volatility) in his investments and add security to future outflows of the fund.

In contrast, synthetic demand is a demand for a product or instrument that doesn't answer a pre-existing need, but rather provide a new niche, exposure or opportunity for an investor. An example for a *pure* synthetic demand might be a trader that places a speculative short-term position in equities or bonds, without taking into consideration any effect on his portfolio. In this case, it is hard to call this position a "natural demand", as the trader is merely involved in a financial speculation, rather than an investment.

In many cases, there is not a clear-cut answer to whether a certain investment product answers a natural or synthetic demand (for instance, think about investment in gold as a vehicle for "value storage").

The housing derivatives reviewed earlier in the chapter (RPX, CSI) could have been used by *natural demand* investors (for example, commercial banks with an exposure to housing prices), but in practice, they were solely used by financial speculators, who wanted to have an easy and inexpensive macro-housing trades.

Alternatively, derivative homes were formed on the behalf of actual need from developers (end users). The financial structure answers a very concrete "demand" to secure the potential upside and avoid "locking-in" losses. By creating an option tool to benefit from market recovery, homebuilders better address market conditions. The tool is packaged (in its later pooled version) and can be traded.

It is a rare case in which developers are cooperating and designing a derivative that is meant to assist with the inherent largest risk associated with development - timing of delivery.

At last, the uniqueness of this product lies in its ability to identify different motives in the behavior of the market players.

While developers want to maximize their return on the *investment* (land and building costs), some buyers perceive the home purchase as a consumption good – the right to reside and use the property for a period of time, determined by themselves (the 30-year limit doesn't seem like a real threat for most buyers).

In addition, self-determined, longer period of holding as well as exposure to loss in a downside scenario could mitigate the common concerns regarding the moral hazard of the resident in his care and maintenance of the property. On the other hand, buyers who feel safe about getting their original inflation-adjusted investment may not make an effort to maintain the property in the last period of holding.

In fact, some buyers see (especially during a financial downturn) the investment aspect of the home purchase as a liability, rather than an opportunity to "build" equity. Derivative - homes allow them to trade the upside for an immediate discount on the "use" aspect of the house.

From the banks' perspective, the upside is not relevant, but downside is very much so. If home price is going down below the purchase price ("under water"), banks' collateral is in danger. The structured derivative homes, allow the bank to finance a lower than market-price transaction price, and by that, getting an effective lower loan-to value ratio.

For the reasons listed above, we find this innovative approach to housing hedging, though limited in scope and effect, to be instrumental in our pursuit of well-structured real estate derivatives.

2.2 Commercial

In a similar fashion to residential products, during the 2000's, there were (both US and non-US based) number of attempts to create, monitor and run *commercial* real estate derivatives products. Moreover, new commercial properties indices used some of the same methodologies (repeat sales, standardization) first introduced in housing products. Due to the scope of this research, we would not be able to cover all of these attempts.

We believe (as we will explain in chapters three and four) that most near-future activity and innovation in real estate derivatives will be focused on commercial real estate products. Therefore, we see special importance in the study of "first generation" commercial products before we analyze contemporary real estate hedging products.

2.2.1 NCREIF Property Index (NPI)

National Council of Real Estate Investment Fiduciaries (NCREIF) is a not-for-profit trade association that serves its members, institutional investment managers who own or manage real estate, as well as the general investment and academic communities.

NCREIF dates its origins to the mid-1970s, when tax-exempt institutional investors, mostly large corporate and public defined benefit pension funds, first began allocating capital to investment in U.S. commercial real estate. NCREIF was set up specifically to address institutional investors need to develop private real estate market databases, as well as risk and return measures.

NCREIF provides commercial real estate data, performance measurement and investment analysis. NCREIF produces several quarterly indices that show real estate performance and returns using data submitted by the association members. We will focus on NPI, the index that served as a basis for the first commercial real estate derivative in the U.S.

2.2.1.1 Index Methodology and Innovation

The NCREIF Property Index (NPI) is a quarterly time series composite of commercial property total rate of return. It measures investment performance of a large pool of individual real estate properties, owned by private-market, NCREIF members. The pool of reporting assets includes investment-grade apartments, hotels, industrial properties, offices, and retail.

The properties are reporting their performance each quarter according to NCREIF's real estate information standards (REIS). The assets' returns are calculated for their *income* (net operating income produced by properties), *capital value* (the appraised value of the asset itself) and *total returns*. Since NPI is an *appraisal-based index*, the capital returns are derived from changes in appraised values.

Quarterly *unleveraged returns* are first calculated for each individual property. Theses returns are then *weighted* by the market value of each property to arrive at the *market return* for all properties that are included in the index. What is being calculated is essentially the return for the entire portfolio of NCREIF properties.

With the emergence of financial derivatives, NCREIF decided to provide its well-accepted index as a basis for *total return swaps* that will allow investors to create a positive (long) or negative (short) U.S. exposure to institutional grade properties. These swaps are settled quarterly, when the index is published.

2.2.1.2. History

Since early 2003, the NPI index is published "frozen" (the index is not revised post-publication,) unless a major error is revealed. Freezing the index was crucial for the development of a derivative tied to it.

In 2005, NCREIF licensed Credit Suisse to be an exclusive OTC market maker for the NPI derivatives.

In March 2006, Credit Suisse executed the first licensed derivatives transactions tied to the NCREIF. The derivatives were discretely structured, priced and sold by the bank. Jeffrey Altabef of Credit Suisse expected significant demand from institutional risk managers. Doug Poutasse of AEW spoke about an opportunity for "Someone who will make lots of money if the property markets tank."

In spite of several public announcements on the opening of a new synthetic market for real estate, actual transactions and trading volumes were very low.

In 2007, Credit Suisse agreed to allow other investment banks to enter the market. Seven market makers participated: Morgan Stanley, Goldman Sachs, Credit Suisse, Lehman Brothers, Merrill Lynch, Deutsche Bank and Bank of America. In November 2007, RREEF estimated NPI volume at about $500M notional value, since inception.

In 2008, Markit became the calculation agent for NCREIF indices.

In late 2008, when the financial crisis hit the world, OTC derivatives were seriously damaged. OTC derivatives are extremely vulnerable to counter-party risk (more on that matter in the next chapter), and therefore reacted strongly to the insecurity in the global markets. Similarly to the situation with housing derivatives we reviewed earlier, the young and small market for commercial property derivatives practically shut down.

Although NPI is still registered for trade and being marketed by Barclays, it is highly questionable whether NPI trading has ever returned to any significant activity since 2009.

2.1.1.3 NCREIF's NPI – Analysis

The relatively low trading volumes of NPI prior to the financial crisis are explained, by some market insiders, as a result of the not-optimal introduction of the new sophisticated product by a *single* investment bank (Credit Suisse). Market exposure is highly needed in the development stage of any new financial instrument, therefore the exclusivity might have harmed NPI's prospects.

By the time other market bankers were allowed to participate, the sub-prime crisis began to unfold, raising investors' concerns about American real estate markets. In addition, as mentioned before, structured finance, and especially exotic derivatives, seemed much less secure than in the years 2000-2007 prior to the financial crisis. These macro-trends strongly affected the interest in the NPI instrument as a legitimate investment and hedging tool.

This explanation calls for additional ones. While it is well-understood that at times of a market downturn, it is difficult to promote new sophisticated synthetic products, it is still not clear why, in the stressed days of 2007-8, only few investors did take advantage of NPI as a an opportunity to profit from declining property markets.

As we saw in regard to housing instruments, opportunistic speculators often perceive the market and act in a similar way. Perhaps, this phenomenon created a difficulty to find matching parties for the OTC short trades (unbalanced market, an issue discussed in the last chapter) and de-facto prevented higher trading volumes.

On the *product level*, some sources in the market think that NPI was a somewhat problematic hedging tool. NPI is *appraisal*-based index, which is updated on a quarterly basis. Therefore it is submitted to some special behavior that is associated with appraisers' valuations.

For example, the researchers Fisher, Geltner and Pollakowski (Fisher et al., 2006) present how appraisers' evaluations tend to *smooth* capital (assets) value movements. Leveling value movements is important in order to control for "noise" (idiosyncratic volatility in the market,) and so to produce reliable market returns. However the smoothing effect might lead the index to miss also some "good" volatility in the market prices. This could be a source of concern for hedgers who are looking for an index that *fully* reflects market movements.

In addition, since property performance is self-reported by the private NCREIF members. There could be a theoretical possibility for data manipulations as well as for uncompetitive inside-information advantage for NCREIF members (who can also trade the NPI derivatives). According to some market experts, these concerns were a significant reason for NPI's relatively low trading volumes.

At last, several market players noted that NCREIF pool of properties ("universe") consists of typically large institutional-grade assets. As a result, the NPI was not reflective enough of the entire commercial property arena. That in turn, caused investors and traders to view NPI as a "niche" product, rather than an "asset class" market exposure.

2.2.2Moody's RCA CPPI (formerly Moody's/REAL CPPI)

The Moody's/Real Capital Analytics Commercial Properties Price Index (CPPI) is comprised of 20 national level indices which measure price changes in US commercial real estate. The indices are produced based on Real Capital Analytics transactions database and repeat-sales regressions processed by Moody's. CPPI indices are published on a monthly basis.

The Moody's/RCA CPPI is the successor to the Moody's/REAL CPPI, and previously the MIT/CRE CPPI index, the *first* repeat-sales index of commercial real estate, which was launched in 2006.

According to market insiders, shortly after the CPPI index was introduced to the market, RCA sold a majority share in its commercialization rights (RE derivative based on the CPPI index) to the giant institutional investor, State Street. Post financial crisis, RCA bought this share back from State Street.

2.2.2.1 Index Methodology and Innovation

RCA focuses primarily on the main income-producing property types: office, industrial, retail, apartment and hotel. RCA research is concentrated on property and portfolio sales of $2.5 million or greater, ($10 million or greater outside of the US.)

Transaction data are gathered from both public records (titles, financial reports etc.) and market insiders (brokers, appraisers etc.) According to sources close to the company, a critical asset of RCA is its network among commercial properties "middle men". Since "middle men" use RCA information for both client advisory and professional rankings, they tend to develop a close and confident relationship with the firm.

After gathering data, each transaction is specifically organized, standardized and reviewed internally according to quality control measures. On average, each transaction is independently reviewed by at least two researchers and based on *two or more* independent sources. Approximately 75% of the prices (data points) are qualified to be included in the index. Prices are averaged if conflicting reports are received from similarly qualified sources.

The confidence in each price (data point) is *categorized* by *pricing qualifiers* depending on the source of the information. RCA also attempts to track all parties to a deal (buyer, seller, any joint venture partners, advisors, lenders and the brokers involved).

While the measuring of office, flex/industrial and retail properties is on price per square foot basis, apartments are based on price per unit.

Similarly to Case Shiller methodology, the *index* is based only on *repeat sales* transactions. In order to control for noise and non-reflective deals, extreme returns filter is set to exclude any paired observation in which the annualized return exceeds +/-50%. In addition, a series of filters are employed to ensure that the prior and current sales are *comparable* and do not represent a material change in use or size. Moreover, 12 months minimal holding period is required for the index database, in order to control for speculative, not representative, transactions ("flips").

The repeat sales method is in contrast to NCREIF's (National Council of Real Estate Investment Funds) product, NPI. As we reviewed earlier, NPI is based on reports from private funds investing in commercial properties. The operating data is processed by *appraisers* who value the underlying assets. Thereafter, the NCREIF Property Index (NPI) is constructed to present an overall market price change of the commercial properties universe.

NCREIF's method was highly criticized for lagging the actual market price movements, due to the lengthy data collection and calculation process, using past operating data to formulate "present" values, small pool of properties and appraisers' valuation biases. (Indeed, NCREIF later presented a complementary transaction based index, NCREIF TBI).

REAL's repeat sales method offered a different approach to real estate tracking tools, which addressed some of the fundamental issues of the NCREIF method.

In January 2012, following a feedback from clients, RCA implemented several changes and additions to its methodology. In the new REAL, RCA aims to capture virtually all relevant information accessible. In a case of a mistake or omission, database and indices are *revised* and adjusted accordingly.

As discussed with sources close to the matter, the methodology revision was related to the commercialization prospects of the indices. Since commercial real estate derivatives require maximal confidence in the index (basis), RCA needed to "freeze" the index against any backward adjustments.

When the new methodology was introduced in early 2012, indices were solely marketed as research tools, allowing RCA to be more inclusive in their data mining and filtering process. As a result, RCA can give a broader picture of the commercial real estate market. The necessary index revisions are actually adding to clients' confidence in the product, but at the same time, are not useable in any hedging context.

2.2.2.2. History

In 2005 RCA joined the MIT Center for Real Estate (CRE) as an industry partner, and started working with the Center's Commercial Real Estate Data Laboratory initiative (*CREDL*) to explore development of *transaction price based indices* of commercial property periodic price changes, using RCA's database.

During 2005 and early 2006, a team led by Prof. David Geltner of the CRE explored several market tracking methods and developed prototype indexes.

In June, 2006, the CRE entered into an agreement with Delta Rangers (DRI), in cooperation with RCA, to develop methodology for RCA-based indexes designed specifically for the purpose of supporting *tradable derivatives*, such as index price total return swaps.

This methodology was subsequently licensed by MIT to REAL, a subsidiary founded by RCA to design and commercialize property indices, derivative products, and asset management vehicles.

In March 2007, Moody's Investor Services partnered with RCA to publish the indices as the Moody's/REAL Commercial Property Price Indices (CPPI). The derivatives trading platform was also developed by REAL.

The initiative was led by Neal Elkin, formerly an investment banker at JPMorgan who came with an extensive experience in structured credit arena (especially Credit Default Swaps). REAL products were marketed and structured as OTC derivatives.

Also in 2007, State Street acquired a majority interest in REAL. State Street is a world leading provider of financial services to institutional investors including investment servicing, investment management and investment research and trading.

Soon after the deal with State Street took place, US real estate markets showed worrying signals, putting a hurdle on the development of a new cutting edge property-related product.

In addition, as reviewed in chapter 2, as a result of the 2008 financial crisis ("Big Recession"), across the globe confidence in financial institutions and their future was under a question, pushing investors to look for safer alternatives to park their capital (such as gold or treasuries).

The case for OTC derivatives, financial instruments that are traded privately through investment banks, was even severer. Since OTC products typically lack transparency regarding the "other side" of the deal/position, the credit risk (derived from the credit-worthy of the transaction-party) is unknown.

Even more so, the market for OTC more esoteric/exotic instruments, (products which do not have a liquid underlying basis) experienced a historical crisis that threatened the very existence of exotic derivatives.

As a result, it is no wonder that REAL efforts to start a dynamic market for commercial properties hedging tools did not materialize. Although the exact volumes are not known due to the secrecy of OTC players, we were told by market insiders that in contrast to other real estate derivatives covered above, REAL products were not traded at all.

This outcome might be a result of being "late to the game", compared to other players, who had couple of strong years prior to the crisis to enhance their derivatives.

Post financial crisis, State Street sold back its majority share in REAL to RCA's principals.

According to sources close to the firm, RCA has no current plans to restart its derivatives business. However, the firm views REAL as an asset for future investment.

As mentioned before, in 2012, RCA changed some of the original methodology used to produce the indices. Consequently, RCA now allows revisions of its indices and is able to produce dozens of new area/type specific indices for market research purposes.

2.2.2.3. Moody's RCA CPPI – Analysis

It is somewhat unfair to examine REAL's failure as a case study for commercial real estate derivatives, as it entered the market in a horrendous timing.

In addition, the partnership with State Street is also a special circumstance. While State Street's position in the institutional world is stellar, few market sources wondered whether its institutional standing worked in favor of REAL's goal. According to these sources, the nature of the product as an exotic-synthetic tool and its relative narrow business scope did not optimally fit State Street's magnitude and conservative perspective.

Some sources think that with a smaller and more opportunistic partner, REAL could have more focused marketing process and perhaps better results.

Another unique aspect is the relationship between RCA research services and REAL's financial proposition. Many of RCA's clients, (including most of the major pension funds, real estate private equity funds, life insurance firms etc.) are also members of NCREIF. REAL had to be mindful about the presentation of its hedging tool as a potential alternative (and competition) to NCREIF's own product, the NPI (Net Property Index).

2.2.3 Commercial Real Estate Derivatives- Challenges

We would like to discuss several elements that could be important for the general discourse about commercial real estate derivatives.

First, product experts emphasize that despite their own expectations, natural hedgers (end users) such as commercial property lenders or institutional investors with real estate portfolio did not show serious interest in the commercial real estate derivatives. In chapter 3, we will discuss the need for such hedging and detail alternative ways those banks and institutional use to hedge their real estate exposures.

However, similar to housing derivatives, we do find financial players such as family offices and hedge funds that find commercial real estate derivatives to be attractive. For those investors, high leverage through low margin requirements is a significant draw.

Nevertheless, a prominent market insider described these players as typical "joiners" rather than "founders" of a new market. The alternative investment world is more dispersed and less interconnected than the institutional world, making the setup of a new asset class backed by alternative investors to be improbable.

Second, a person close to REAL reported that the marketing process was difficult due to an unbalanced perception of commercial RE macro-markets. According to this view, market players who are interested in a global exposure to commercial RE too often think alike.

In a similar way to most trades, a transaction takes place when there is a disagreement regarding either the *current* value or the *future* value of a product. A disagreement can also happen regarding a commodity or other standardized asset (ETF, tax credits, etc.), but in this case the disagreement will be on the *future* value of the asset (stock market drivers, future tax rate and corporations' profitability etc.) rather than the actual commodity value.

REAL and NPI, as proxies for national commercial real estate, are providing an exposure to the market as a whole (commodity like). To have a vibrant trading environment, there is a need for a fairly balanced demand and supply, or in other words, opposed views regarding the direction the *market* is heading.

Although people tend to disagree about the value of a *specific asset* or even the state of a *segment* of the market, there is usually more of an agreement when an entire market (US commercial real estate) is put into question. Therefore, it is much more difficult to *start* trading a market proxy than a specific asset.

Some market experts dismiss this theory and say that even if that's the case, the market, sellers and buyers can "price" the consensus (over-demand/over-supply) till a balance point is reached and trading is eventually taking place.

We believe that this argument is somewhat problematic as it supposes the market players want to act (sell or buy) at any given price point. In practice, there are many cases where participants, despite having a view regarding the market (proxy), they prefer to hold and not to act. An outcome of such a scenario might be very wide ask/bid spreads we witnessed in exchange-traded property derivatives.

Even when the premium/discount is large enough to reflect the market consensus about the basis price, players might believe there are more efficient ("cheaper") ways to benefit from longing/shorting the market through direct investments in "hard assets".

Third, players who want to bet on/against the *commercial space* can use already existing products such as REITs exchange traded funds, commercial real estate-targeted mutual funds or investment across real estate private equity funds, and do not have to act through a new synthetic platform.

This is not the case for the housing market to which it is much harder to get an economic (real) exposure, and therefore one could more easily accept the benefit of *housing market* exposures using synthetic products.

The *combination* of the previous conditions may explain how interested *financial* players find other accessible forms of *macro* commercial real estate exposures. The result is a great difficulty to *start* the trade of a *new synthetic product* focused on the *commercial* space.

3. Real Estate Derivatives – Macro Analysis

3.1 Real-Estate Hedging Alternatives

A key point to the discussion on the prospects of property derivatives depends on the natural demand for hedging. Liquid derivative markets, such as currency, commodities and interest rates, serve financial and business players in their day to day operations. It would be difficult to imagine some functions of modern economy and finance without the existence of highly liquid derivative markets.

For example, when a firm signs a substantial export or import contract, it will seek to reduce the additional risk (reflected in the potential volatility in future proceeds) caused by the dealings with a foreign company. With currency swaps, forwards or futures, the firm can "fix" the currency rate for a period of time, and eliminate the future volatility in foreign exchange rates and its possible negative effect on pricing and margins.

In commercial real estate we also find the common use of derivatives. When a customer requests applies for a (either commercial or residential) mortgage from a bank or other financial institute, he can often choose between a floating interest rates and a fixed rate. Although treasury yields are constantly changing, affecting "prime" lending rates (a widely accepted index for commercial lending, based on a risk-premium over treasuries rates), it is pretty easy to get a *fixed* rate loan.

The bank is able to provide a fixed rate loan by purchasing interest rate derivatives, and therefore setting the interest rate for the duration of the loan. The price of the derivatives is calculated into the costs of the loan.

Additionally, some large commercial borrowers take care of the hedging-"swapping" by themselves, allowing future optionality to increase/decrease its interest rates exposures.

However, properties financing firms are highly exposed to a major, though different kind of risk, *real estate values*. When property value deteriorates the lender is at risk.

As we reviewed in chapter 2, in the 2000's, there were number of attempts to create reliable real estate property hedging tools. We saw how beyond the specific of the different products, a vicious cycle of low liquidity and poor hedging, put a significant hurdle on the development of these attempts.

In addition, we were surprised to witness how natural candidates for real estate hedging were completely missing from the trading of the new products. That fact raised the following question: *Do financial institutes hedge their property risks, and if so, how?*

I would like to propose two opposed views:

Some insiders who were involved in the first attempts to start real estate derivatives argue that *financial firms do not hedge themselves from real estate risks*. According to this view, there are certain risks that are impossible or close to impossible to control (hedge). Real estate is one of them.

Unlike other derivatives, property derivatives' value is not derived from a *liquid* underlying asset, but rather from an *information index (tracker)*. As such, there are severe inherent risks in using the synthetic derivatives as hedging tools.

We will point on prominent matters associated with past real estate derivatives:

- Basis risk – Typically, banks and other financial firms are exposed to specific assets of various locations, kinds, sizes etc. Since properties are unique (not standardized) there is a risk that the derivatives (which are based on information index) will not provide a parallel exposure to that of the financial firm. In such a scenario the derivatives will not accurately "hedge" from the firm's risks. However, if the real estate exposure of the financial institute is large (very high number of properties) and diverse (properties are spread across locations, kinds, price levels etc.) such a basis risk would be lower.

- Noise – Noise is the tracking error risk. The index and derivative is planned to track the market. However, statistically, it is almost impossible to avoid some "noise" or inaccuracies in the information. The result of this noise could be an information index which will not fully and accurately reflect the market. Over time, the noise risk is reduced. However, for *short term* "shorters" (those who want a downside protection), noise might be a significant issue.

- Liquidity and Arbitrage – Unlike "main stream" derivatives, property derivatives do not entail arbitrage optionality. Brick and mortar real estate ("hard assets") cannot be traded for (or in direct relationship to) real estate derivatives. Therefore, a classical arbitrage trading (a trade that closes a sure valuation gap between interconnected products or asset classes) is not possible.

> Moreover, so far, esoteric derivatives (including RE instruments) have not attracted high trading volumes. In fact, as we reviewed in earlier chapters, since the 2008 financial crisis, total volumes were strongly decreasing. Since institutional investors have strict regulations on investments in illiquid assets (all holdings should be "marked to market", making it more difficult and riskier to invest in low-volume markets), they are reluctant to use highly illiquid products, such as real estate derivatives.

In fact, the combination of lack of arbitrage as well as liquidity constraints explains the vicious cycle ("chicken and egg") problem. The structural limitation on arbitrage reduces immediate price "corrections" needed for a well-functioning market. The lack of market efficiency, in turn, leads conservative and institutional players away from these products, and hence maintaining the products as illiquid.

Another interesting point raised by a veteran of the real estate derivatives arena, relates to the hedging *demand* of financial end-users. According to this opinion, many lenders and investors in properties *perceive* their exposure as a *long term* situation rather than a financial exposure. Like other long-term positions, the investment or debt are strongly correlated with cardinal economic indicators (employment, GDP, stocks etc.) Since financial firms generally choose to be net "long" (to have net positive exposure) on the economy, they do so, also in regard to real estate ("naked" exposure to selected properties and loans.) From that perspective, these firms are well-prepared to withstand fluctuations over time in order to keep their position to benefit from the long term expected return associated with the asset risk (risk premium.)

We find this argument to be compelling in regard to institutional RE *equity investors*, such as pension funds, life insurance companies, mutual funds, whose role is to manage and invest clients' savings. In this context, an overall *long-term* position in yielding assets seems reasonable.

On the contrary, Banks and other firms with debt (lending) focus are in the business of assessing and pricing credit *risks*. As we mentioned before, lending institutions are very familiar with the advantages of hedging through financial derivatives. Therefore, we could expect them to be more interested in real estate hedging. Their lack of activity in earlier RE derivatives says more on the quality and constraints of past products than on the natural demand for real estate hedging of financial firms.

An opposed view suggests the following: Banks and other *financial firms do hedge themselves from real-estate risks.*

According to this opinion, stated by couple of senior traders and alternative investment managers, real estate hedging is frequently done by a type of fairly liquid instruments: Real estate *debt* derivatives.

Real estate debt derivatives are structured as total return swaps, based on indices that track *pools* of Residential Mortgage Based Securities (RMBS) or Commercial Mortgage Based Securities. The indices are usually named MBX or CMBX, followed by a series number. Each index tracks a pool of securitized mortgages, which include varied tranches (segments) of debt, across the subordination (debt-seniority) structure.

There are dozens of such indices and derivatives traded, providing *exposure*s to *cash flows* (securities interest) of the pool of securities (long), as well as protection in the case of decrease in the value of the pooled securities (short).

MBS/CMBS derivatives are structured as *synthetic total return swaps*, tied to a specific MBS/CMBS pool index.

In these total return swaps, the seller a is liable to pay the buyer all cash flows generated from the referenced securities, *as if* the buyer actually bought those securities. In return, the buyer (who didn't *really* buy the referenced securities) is accountable to *settle* ("mark to market",) on a monthly basis, the indexed value of the referenced securities to its value at time zero - the beginning of the swap.

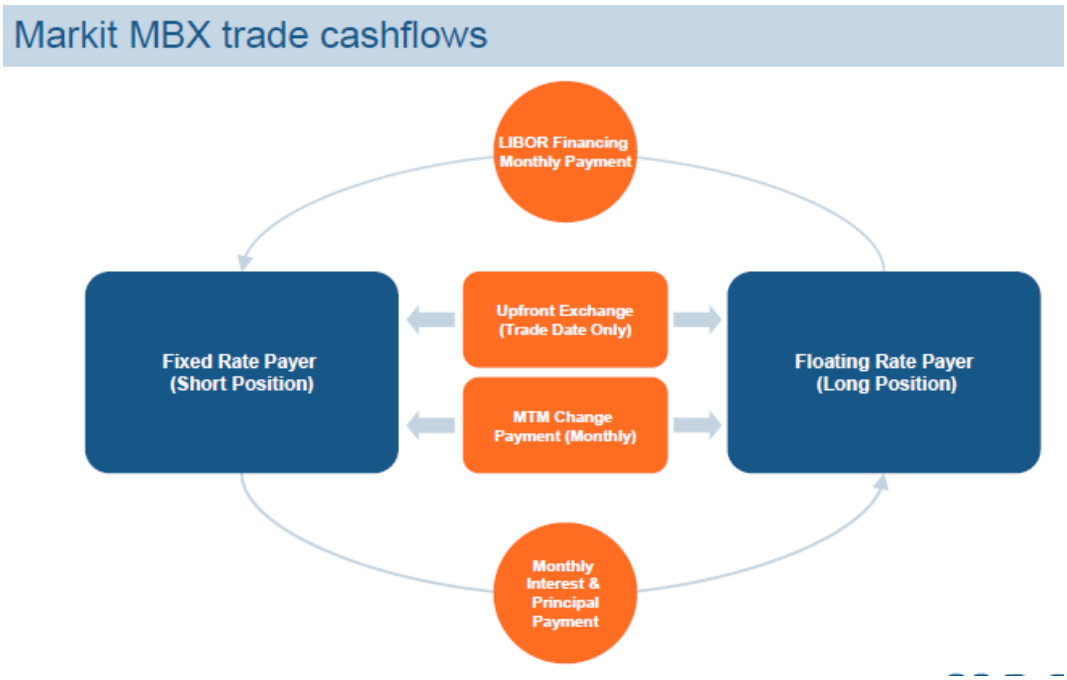
Therefore, the seller (short) will regularly pay the buyer (long) the cash flow components, principal and interest of the *referenced* pooled securities, in return to a protection for a potential decrease in the value of the referenced securitized loans. If a default occurs in one or more loans of the pool, those securities' *market value* will drop. As a result, the index of securities will also decrease. In this case, the buyer's settlement would function like credit default insurance in favor of the seller (shorter).

The buyer would also have to pay the seller, through monthly settlement, for *any* fall in market value of the referenced securities. For example, in case of concerns regarding the credit risk of these securities, the prices might drop (and yields rise), causing the index to decrease as well, and therefore, the buyer would have to settle this value loss through the monthly settlement.

On the other hand, in a case of yield compression, (securities are traded for higher values, reflecting lower yield), the monthly settlement will work in the buyer's favor (as if he held the referenced pooled securities.)

The buyer (long), who is eligible for all *referenced* cash flows generated by the referenced securities, pays the monthly LIBOR to the seller to offset referenced cash flows to reflect only the securities *risk premium*.

Below is a chart (done by the financial-information firm, Markit, in May 2010), presenting the cash flow for a typical MBX derivative trade:



The volume of real estate debt derivatives is strongly correlated with the volume and liquidity of MBS/CMBS traded securities. Although the swaps are purely synthetic and therefore could theoretically be unrelated to the actual liquidity of securitized loans themselves, MBS/CMBS supply and liquidity are important for both index reliability and demand for hedging. The more liquid and efficiently-traded the referenced securitized loans are, the more end-users view the index-based derivatives to be a viable hedging tool.

Moreover, when referenced pools are large and liquid, demand is likely to increase from arbitrage opportunities between the referenced securities trading and the indexed MBX/CMBX derivatives.

According to several traders we interviewed, financial firms are active in the trading of MBX and CMBX and *use them to hedge their "hard assets"* exposures.

According to this view, since financial firms (especially lenders) are mainly exposed to real estate *debt*, their exposure might be better controlled by a debt-oriented hedging tool.

Lending risk is different than simple cash-flow volatility, as debt entails virtually no upside (interest payments are fixed till maturity), but a "full" (100%) downside (the whole amount of the principal).

Moreover, equity investors can reduce idiosyncratic risk (a risk which is *not* correlated across assets) by investing in a range of assets. Therefore, "positive" volatility (upside) in some assets can offset "negative" volatility (downside) in others. However, lenders are fully exposed to *each* of their loans, so every loan that defaults causes a loss that will not be offset by other loans in the portfolio. Therefore, diversification of loans can only reduce the probability of an *extreme* loss, but not the total *expected* loss of the portfolio.

This view suggests that financial firms found a viable way to mitigate some of their real estate debt exposure with MBX/CMBX derivatives. By doing so, they benefit from a more liquid and well-suited hedging solution than the previously reviewed real estate *equity* derivatives.

This opinion is compelling but leaves room for questions:

Is it possible that post-financial crisis, the relatively lean MBS-CMBS field is large enough to enable prominent commercial or residential lenders to hedge themselves from real estate risks? Is there still a hidden demand for another sort of properties hedging instruments?

In addition, large institutional investors which have significant real estate *equity* exposure, in the form of sizeable investments in "hard assets" and real estate private equity funds, how do they manage their risks? Is there a potential for a better product, in terms of liquidity, convenience, access and costs, to address their real estate investing needs? In chapter 4 will attempt to answer some of these questions.

3.2 Regulation and Implications

In chapter 2, we mentioned that following the financial crisis, over-the counter (OTC) trading sharply declined, a phenomenon that had harsh implications on illiquid exotic derivatives.

In this chapter we would like to review several regulatory macro-trends that are currently taking place and to refer to the potential influence these developments may have on the prospects of new real estate derivatives.

"I would not base my career on exotic OTC derivatives", that was the conclusion of a managing principal and head of risk management in a large Wall-St. hedge fund. He offered us several reasons for his pessimistic conviction:

First, the risk manager explained that derivatives risk models are becoming more and more complicated and expensive, putting a substantial barrier on the introduction of new and less liquid derivatives.

Usually, risk management infrastructure is set by a clearing house. A clearing house is a financial firm that provides clearing, settlement and other transaction related services for financial derivatives, traded through either an exchange or OTC. However, some OTC derivatives *are not cleared* by any clearing house, and therefore include higher counter-party risks.

The clearing house stands between the two parties to reduce settlement counter-party risks, by requiring margin deposits, providing independent valuation of trades and collateral, monitoring the credit of the counterparties, as well as providing a guarantee in case of a default of one of the parties.

Since clearing infrastructure has become more exhaustive and complex, the clearing costs rise as well. Consequently, clearing houses are unenthusiastic to set the expensive clearing infrastructure for small and new products.

Second, In July 2012, the Basel committee on banking supervision ruled that all derivatives trades will include a *capital charge.*

Under the new rule, banks using clearing houses will have a *2% margin* requirement on their derivatives trades. *Uncleared* derivatives trades will have a margin requirement of *up to 15%.* The lower 2% capital charge is intended to create an incentive to *clear* derivatives trades.

Industry insiders believe these margin requirements could mean banks will *stop trading* some derivatives to avoid having to find more expensive capital to back them. The negative impact on derivatives trading, and especially on the prospects of OTC products (including real estate derivatives,) is clear.

Third, the Volcker Rule, a section of the Dodd–Frank Wall Street Reform proposed by former Federal Reserve Chairman, Paul Volcker, to constrain United States banks from making speculative investments that *"do not benefit"* their customers.

Based on the argument that speculative activity of major financial firms played a crucial role in the 2008 financial crisis (Lehman Brothers, Bear Sterns, AIG and Merrill Lynch fell apart for poor balance sheet and catastrophic investments and subsequently became the catalysts for the global financial crisis,) the rule essentially bars *proprietary trading* by commercial and investment banks.

Proprietary trading is in-house trading and investing, using the *bank's own accounts*, with the intention to *profit* from the trade, rather than generate transaction fees. The Volcker rule aims to minimize conflicts of interest between banks and their clients through separating the client-oriented practices (advisory, lending, trading brokerage etc.) from the proprietary trading and investing of the banks themselves.

According to the Federal Reserve Bank, Volcker rule's provisions on proprietary trading are scheduled to be fully executed on July 21, 2014. In the meantime, banks should "engage in good-faith planning efforts" to ensure they are in line with the restrictions no later than that date.

A senior banker from an important investment bank told us that although the Volcker rule virtually eliminates banks from being an active player in derivatives trading, some banks select somewhat lenient interpretations of the law about the actual definition of proprietary trading.

These banks argue that in order to function as market-makers in relatively illiquid markets, they have to "take a position" for a short-medium term, till they unwind it when they "make" the market and find buyer/s for the held derivatives. Obviously, the bank intends to *profit* from the interim period, but classifies the gain as a commission, rather than a trading activity. It is not clear how regulators view this practice, and it is yet to be seen, when the Volcker rule is fully implemented.

The potential effects of the Volcker rule on real estate derivatives are multifaceted.

As we learnt in chapter 2, both exchange-traded and OTC products needed the backing of an active and committed market maker. In the past, the market maker was instrumental in providing liquidity and pricing to the market as well as taking the "other side' of desired positions. Frequently in *OTC products*, market intelligence was a driver for an increased involvement of the market maker, in an anticipation of significant trading profits based on the structural information advantage.

Volcker rule, in the short term, is a serious hurdle for the advancement of new RE hedging products. Investment banks will be limited in their ability to profit from trading activity, and therefore, might be less incentivized to participate in market making. This concern is particularly relevant in regard to exotic products, whose size is not likely to justify involvement of investment banks based solely on transaction commissions.

In the longer term, the Volcker rule might lead to a *positive* effect on the prospects of new real estate derivatives. By prohibiting banks from having an information advantage over their own clients (traders), there is a potential for a better, more balanced and reliable market. If traders know that the intermediary financial firms that connect between traders are excluded from the "game", they might gain confidence in the "open"- market, channel more capital to buy financial instruments and enhance efficiency ("chicken end egg".)

Another aspect of the Volcker rule is the exit of banks in-house trading teams to form independent investment groups. According to market insiders, because of the regulatory barriers on highly profitable proprietary trading, in-house traders are urged to leave large financial firms and initiate their own investment "shops".

As we mentioned before, private funds had an important role in the trading of first generation real estate derivatives. Therefore, we think that dispersion of traders and formation of new private investment teams could contribute, over time, to the development of more "democratic" and active derivatives markets and positively affect the prospects of new real estate derivatives markets.

At last, in May 2013, the Commodity Futures Trading Commission (CFTC) passed a regulation regarding the minimal number of quotes a trader has to obtain before he executes a trade with a market maker. According to the new law, a trader must enquire a derivative price with at least 3 market-makers before a transaction.

The background for this regulation is rooted in the flawed relationships between large ("bulge bracket") investment banks and their clients.

According to senior traders, investment banks regularly put heavy pressure on clients to execute trades using *their derivatives* groups and products. As part of their marketing campaign, sales people develop close relationships with traders to gain more derivatives transaction fees, as well as access to valuable *market information*, later used by in-house trading teams or passed on to "preferred clients".

On the other hand, clients are largely dependent on the banks for future assistance with liquidity, settlements and information. As we earlier reviewed, OTC trading is controlled by a few large investment banks which serve as market makers. Clients need the banks' help in regard to efficient and quick clearing, getting rid of illiquid positions and settling (purchasing an offsetting exposure) "bad" exposures. Moreover, the clients believe that a close relationship with a market maker can give them an information advantage over other players.

For these reasons, clients tend to "*agree*" to work with a *single* major vendor (market-maker). According to market insiders, this situation allowed banks to have an *uncompetitive* advantage in OTC markets.

CFTC regulation aims to cure this deficiency. By forcing traders to have a relationship with at least three market makers (in the form of a quotes inquiry) prior to any OTC transaction, supply and demand volumes as well as pricing information would flow more freely between market players. As a result, the market will become less controlled and more efficient, and so the uncompetitive structural advantage of investment banks will be reduced.

In addition, market makers, who have frequently used clients to mine market intelligence, will be less likely do so. Since clients will have more relationships with market makers, investment banks will be more careful of their privacy to win their business (transaction fees). As a result, clients will be more likely to receive a candid and fair service from investment banks.

If this regulation proves successful, there will be higher chances to start and operate new derivative products through OTC platforms.

In the next chapter, we will review a present attempt to establish a real estate hedging tool. Having in mind both real estate risk management circumstances and the current regulatory environment, will allow us to explore the product innovation and unique value proposition of the new instrument, Pure Property.

4. Pure Property: Liquid Exposures to Commercial Real Estate

4.1. Product Description and Innovation

As we reviewed in previous chapters, there were several attempts to address the demand for real estate risk management (hedging) tools. In contrast to past products which were all based on *information* indices (either transaction or appraisal based), Pure Property offers a *liquid* exposure to commercial real estate, based on *stock-market property return* indexes.

Pure Property was developed by real estate experts from both MIT's Center for Real Estate (CRE): David Geltner, Henry Pollakowski and Holly Horrigan as well as National Association of REITs (NAREIT) senior researcher, Brad Case. They formulated and patented (July 2010) a commercial property index (proxy), based on the market value of traded REITs.

The Pure Property index tracks, on a daily basis, the relative value change of the *underlying* commercial *properties* held by REITs, as valued by the REITs stock quotes. In June 2012, NAREIT and FTSE, a financial information firm, started to publish the index.

Public REITs are *exchange*-listed companies, whose main focus is to own and manage yielding properties on behalf of their investors. Since REITs are intermediary vehicles which assist private and institutional investors to invest in commercial properties, REITs are entitled to a special tax structure that generally exempts them from *corporate* tax liabilities. REITs have a mandatory spread-out ownership structure (50% of the shares cannot be held by 5 or fewer holders), and are obliged to distribute at least 90% of their taxable income to the shareholders.

While all public REITs follow the same guidelines, REITs are well diverse in their investments and returns due to their different selection of properties (sector, geographies, risk etc.) and management styles (leverage and financing decisions, asset management skills, property maintenance efficiency etc.)

According to NAREIT, as of 5/312013, total equity value of 167 public (non-mortgage) REITs was $597 billion. Taking into consideration a reported average debt ratio of 33.3%, public REITs total underlying properties are worth approximately $900 billion. As a reference, NCREIF estimates that investment-grade (*large* properties that are typically held by institutional investors) privately-owned commercial properties are worth approximately $4 trillion, (total value of all sorts of commercial real estate is about $9B.) Of this universe, NCREIF's reporting properties worth about $330 billion.

The public REITs world grew to a scale that according to some industry insiders, it could be an *effective representative* of total investment-grade commercial properties universe.

REITs, being exchange-traded products, could resolve a fundamental challenge with direct real estate investing and hedging, *illiquidity*.

Pure Property's major objective is to extract the underlying properties value from the REITs market price. This is done by *de-levering* each REIT's capital structure to represent the market price of the properties held free of debt. As this procedure is done across all sorts of public REITs, it is possible to construct an *industry* index as well as *regional* and property *sector* indices that track, on a daily basis, the *market value* change of REITs "pure" real estate.

According to the product developers, given the diversity, size and market share of REITs assets, one could use the industry index as a *proxy* for U.S. commercial properties value.

In addition, the REITs' diversity and magnitude allow to accurately track *specific* property types as well as particular U.S. regions.

Based on the Pure Property *indices*, NAREIT and FTSE are currently working with financial firms to construct a new commercial real estate derivative. The derivative will be formed as an Exchange-Traded Fund (ETF) that will hold a portfolio of REITs shares (equity) and bonds (debt) to mimic the different Pure Property indices performance.

As noted earlier, REITs' own properties are backed by both equity and debt. The Pure Property ETF will regularly rebalance its equity/debt holdings to accurately de-lever its REITs holdings and so will represent the up-to-date properties value as traded by the market.

The product is pioneering from a number of perspectives:

Valuation – First, some industry sources are reluctant to accept REITs valuation as a proxy for illiquid commercial properties. According to these views, REITs are real estate *stocks*, and as such, they are often traded by retail investors (attracted to "dividend stocks"), as opposed to large institutional investors which are the usual players in investment-grade properties.

According to these opinions, REITs are often held for shorter periods of time and are more *volatile* than direct assets. Additionally, REITs investors are more influenced by behavioral investing patterns associated with public equities investors. As a support to this opinion, they point on historically significant *correlation* (ranged between 30%-50%) between general stocks and REITs.

Second, some market insiders claim that since REITs are public companies, they inevitably involve multiple *corporate* and *financial* elements (equity and debt issuance, mergers and acquisitions of companies, general administrative -"headquarters" expenses, development of commercial properties) that affect the REITs value. These sources argue that even when de-levering process is fully implemented, the index is not a pure exposure (pure play) to the underlying assets value.

Pure Property developers address these arguments as following:

Regarding the first argument that REITs are traded and behave more similarly to stocks than to physical assets, they point on a failure in the argument itself. Since there is a consensus about the impossibility to get a frequent, reliable proxy based on "hard assets" (there is no efficient market for such assets), we suppose there is no one.

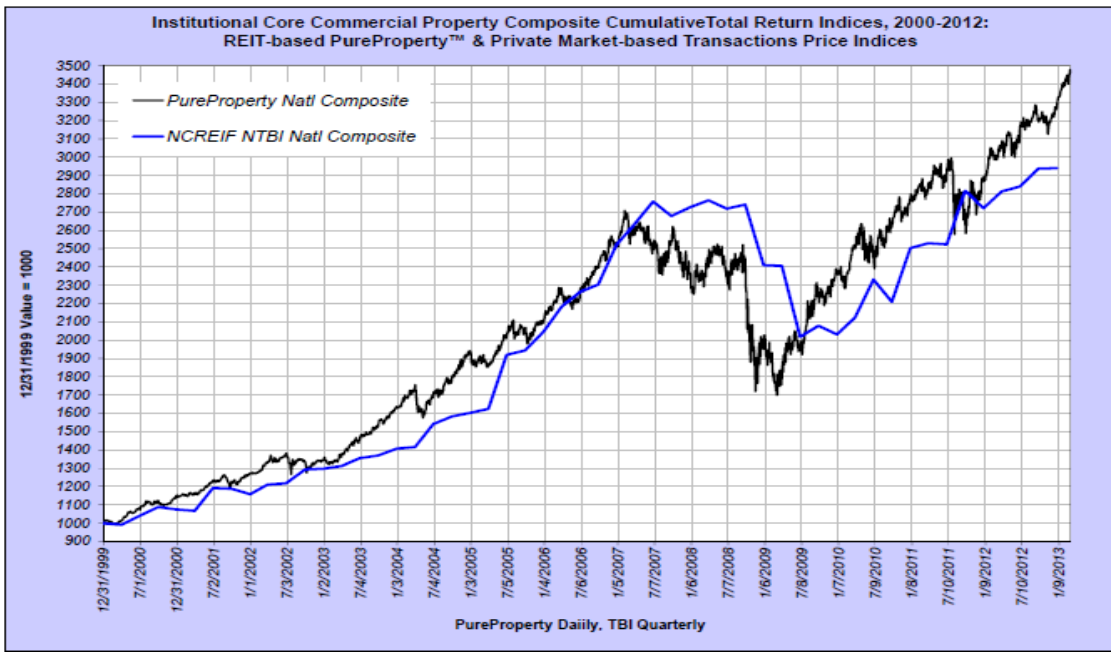
However, that is not true. Pure Property relates to a very large pool of "hard assets" that are publicly and continuously traded. *If*, as a result of having a liquid real estate investing option, the buyers' profile and holding period is partially different than in direct property investing, it is *irrelevant* to the valuation process itself. Since real assets are actually given a *concrete and reliable price* in a fairly efficient market, one cannot dismiss the proxy based on existing valuation obstacles (sampling, lagging, biases etc.) derived from the very illiquidity of non-REIT commercial assets.

Moreover, correlation with general stocks could be more a consequence of enhanced liquidity (that allows investors to move "in and out" from an investment,) than a result of "hidden" REITs and stocks common characteristics. In other words, if "hard assets" investors, at large, could have transected at any given time, they would have reacted similarly to important economic and financial factors (unemployment rate, Federal interest rate etc.), and therefore their price behavior would have also been positively correlated to that of general stocks.

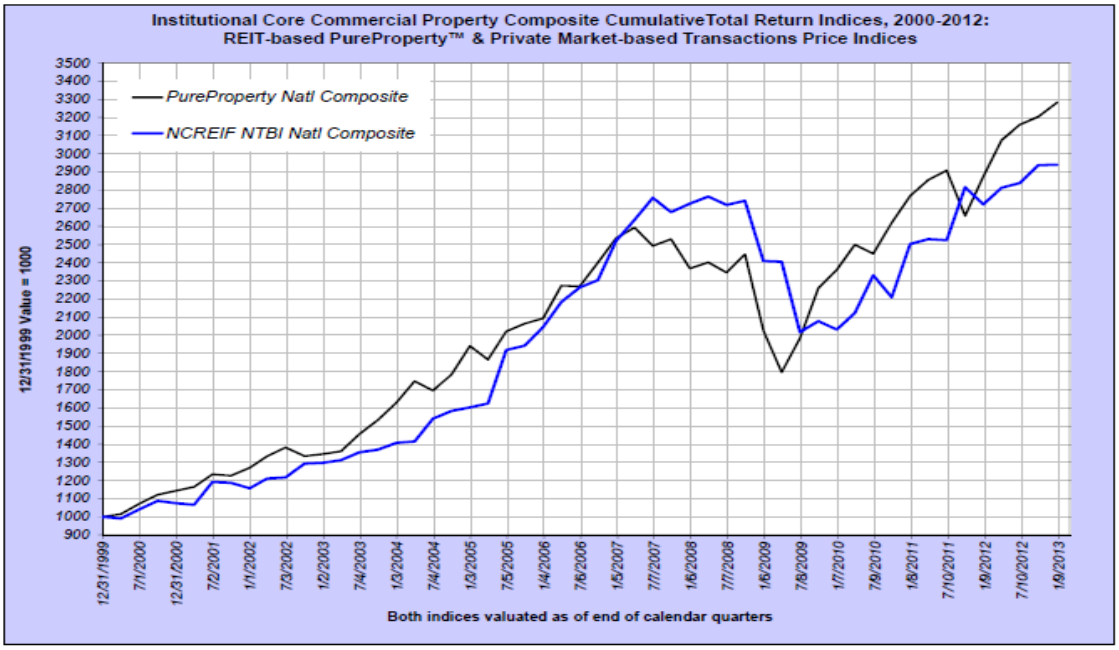
Additionally, from volatility perspective, when the Pure Property data is adjusted to quarterly reporting frequency (as seen in the charts below,) the index, similarly to other non-liquid commercial real estate proxies, is not more volatile than a transaction-based property index. Having a daily (and even continuous) data points definitely add to the volatility, but then a right comparison should be to direct real estate *daily* index.

The comparison with non-REIT indices also sheds light on the *advantage* of using a liquid proxy to reflect assets prices in a timely manner. As seen in the charts below, NCREIF transaction-based price index (NTBI) tends to lag the Pure Property index.

The charts below (taken from Prof. David Geltner's presentation on 10/17/2012,) compare the Pure Property and NCREIF-NTBI indices since 12/31/1999:



In the second chart, the Pure Property index is adjusted to *quarterly* frequency (, based on the end of quarter values of the daily index):



Regarding the second argument about external, non-property, factors affecting REIT valuation, Pure Property developers distinguish between two kinds of REITs non-real estate value drivers: Corporate and Financial.

Corporate elements such as, management skills and administrative costs can indeed significantly affect a REIT's market value. However, when taking an *aggregate* pool of REITs, most of the corporate value drivers from the different REITs will cancel each other.

For example, since some firms get a *premium* (over net asset value) for good management skills or costs efficiency and others receive a market *discount* (over net asset value) for the poor management skills or costs inefficiency, the end result is that REITs *in total*, are valued for the worth of the underlying assets.

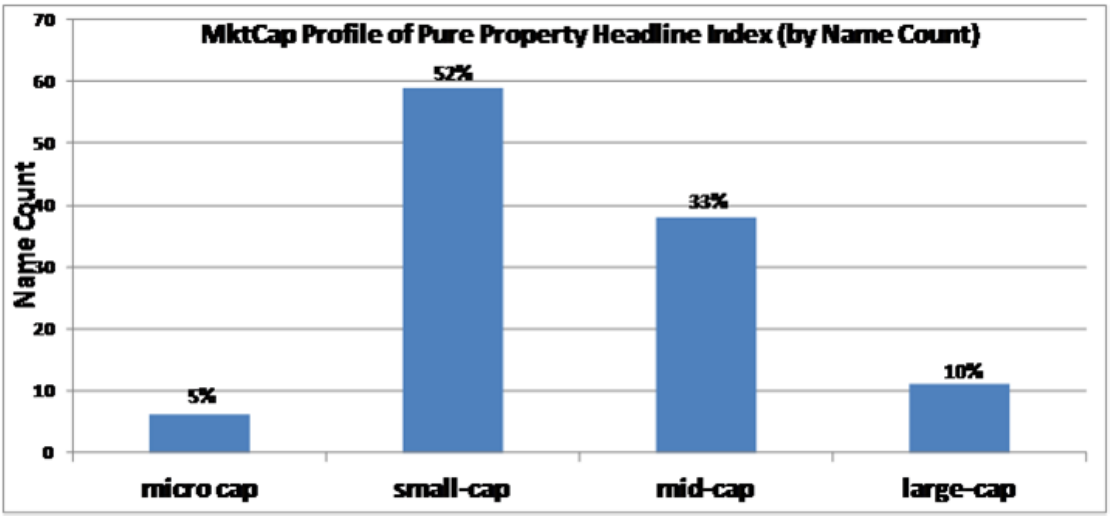
As for financial elements that influence valuation such as, equity and debt issuance or merger and acquisitions, Pure Property insiders admit that the index should carefully *control* for these factors. (Without going into the mechanics of these procedures,) Pure Property developers emphasize the importance of *continuous re-balancing* of the index. The rebalancing will ensure that any *significant* change in the capital structure (new debt or equity, preferred shares, bond yield movement, merger or development of a new asset etc.) will be taken into the calculation of the de-levering process of the index. As a result, Pure Property is able to (at least partially) offset value fluctuations driven by financial decisions of REITs.

From our conversations with one of the developers of the product, we would like to note that much effort is currently dedicated to monitor and control for financial factors in the valuation process.

Since the rebalancing act is crucial to keep the index "pure", the index composers are paying a special attention to REITs liquidity. While sector's liquidity is constantly growing (May 2013 volume was $4.9B, compared to only $3B in May 2008 and $800M in 2003), trading volumes are highly varied across REITs.

The concern is that low-liquidity REITs will not have enough trading capacity (volume) to allow significant (long or short) positions. Since Pure Property aims to reflect the entire universe of commercial property as well as to provide specialized exposures to individual sectors or regions, it is important to hold positions across as many diversified REITs as possible. However, some smaller REITs do not have enough liquidity to support Pure Property significant holdings. In addition, to implement necessary rebalancing actions (buying or selling big blocks of shares to mimic underlying assets) there should be confidence in the trading capacity of the included REITs.

Therefore, we believe that the index will, at least in the beginning, include *mainly* larger *liquid* REITs. Since the REITs universe is polarized in size (see the chart below), the number of REITs and scope of assets included in the index might be low, and have an effect on some of the matters raised before (the index being a proxy for the entire asset class, whether pooled REITs' valuation is affected by superior management skills and better costs management.)



Functionality – Pure Property is innovative from several functional aspects.

First, Pure Property offers specific ETFs to achieve *focused exposures*, per sector (Apartment, Health Care, Hotel, Industrial, Office and Retail) and per region (East, Midwest, South, and West).

REITs often specialize in a particular sector and some REITs are active only in some specific regions. In order to get to a *pure* regional or sector or regional exposure, Pure Property makes use of "shorting" (borrow and sell) REITs of *other* regions or sectors to offset the "impure" holdings of the selected portfolios. As a result, the constructed specialized ETF can provide the investor a *synthetically "clean"* exposure to the specific region or sector the investor chooses.

Here again, it is important to note the high dependency of specialized Pure Property on underlying REITs liquidity. The more specific the synthetic portfolio is, the less matching available REITs are. Consequently it might be difficult to provide these specialized ETFs in all regions and sector.

Second, unlike past products that were created in the limited context of exotic derivatives, Pure Property is created as an *ETF*, and as such has a great potential to cater to all sorts of investors and to have an important role in institutional portfolio allocation.

In contemporary finance, there is an ongoing critical discussion about the value of active portfolio management. The discussion relates to the rationale behind managing investment portfolios (to achieve alpha,) as according to modern financial theory, it is close to impossible to *consistently* "beat the market", (on a risk-adjusted basis.) Moreover, active management costs themselves increase the probability for underperforming the market.

As a consequence many investors prefer to hold a "passive" portfolio. Passive portfolio managers do not aim to select the optimal securities available, but rather offer a well-diversified, cost-efficient portfolio that addresses a certain risk profile. Frequently, a portfolio manager or a retail investor will merely buy an ETF rather than construct a diversified portfolio by themselves.

Another alternative to active management is *managing betas*. According to this method, a portfolio manager selects the markets and asset classes, (but not the specific "names",) based on his *macro analysis* and clients' risk profile. Such an investor usually uses ETF to get exposure to different markets.

Since Pure Property ETF can offer a *liquid, diversified exposure* to commercial properties (an asset class), it has a great potential to attract demand from many major passive portfolios who did not have the opportunity to invest in *liquid real-estate* (as opposed to REITs which entail leverage and hence are not pure.)

Additionally, region or sector specific ETFs can well serve some "beta investors" with the ability to allocate capital based on geographies and asset types ("markets"). (However, the ability to construct a highly focused exposure to a specific state or a city is limited as the REITs pool active in such a narrow area is probably too small for supporting a reliable Pure Property index of that area.)

Liquidity – Pure Property offers a substantial advantage over past products, being based on an underlying liquid asset, REITs.

As we reviewed in previous chapters, the key common issue with past attempts to initiate a robust market for real estate hedging instruments was the lack of liquidity that in turn, reduced the likelihood for more players joining the market ("chicken and egg" problem). We also discussed the negative effects on derivative liquidity, caused by the lack of an *underlying liquid market* (past products were based on *information* indices, and therefore only indicated of price movements in a referenced pool.)

On the contrary, Pure Property is constructed directly from the underlying publicly traded assets (as an ETF holding both REITs equity and debt,) therefore there is an *inherent* liquidity in the product. For example, even if an investor is concerned that the Pure Property ETF will not be a popular product, he has no reason to worry for being able to sell his exposure, as the derivative consists of many publicly traded securities that could be sold separately.

In addition, a common problem with past products was related to the counter party risk associated with (mainly OTC) synthetic derivatives. However, Pure Property derivatives are formed as ETFs and do not entail any trading *counter party risk*, other than the credit risk of the bonds (held in the ETF), issued by the REITs themselves.

At last, past products experienced times when there was an unbalanced demand or supply in the market (more demand for "long" than "short", or vice versa), expanding derivative ask/bid spreads to barely bridgeable levels, and thus reducing market activity. In the past, market makers placed their own positions to "balance" the market. Under new regulations which limit involvement of market makers in proprietary trading, this "one-sided" market phenomenon is becoming especially problematic.

In contrast to the past products, Pure Property ETFs do not require a balanced market at all. Since the ETF is constructed from the underlying liquid securities, the market for Pure Property can be "net long" or "net short". The excess supply or demand is likely to be absorbed by the REIT securities market(, other than in extreme situations).

In the next pages we would look into the specifics of an exchange traded fund (ETF) and consider their potential implications on the prospects of the Pure Property products.

4.2. Pure Property: ETF as a Derivative

Exchange Traded Funds (ETFs) are an investment vehicle that offer investors an *undivided* interest (share) in a pool of stocks as well as other liquid assets, such as commodities, bonds etc. As of 7/1/2013, U.S. ETFs had total assets of close to $1.45 trillion, this tool is currently one of the most growing sectors of financial services.

ETFs characteristics are different from both, close-end and open-end, mutual funds. Unlike *close-end* mutual funds, which allow shares to be sold *only* undivided, ETFs have a mechanism of *creation and redemption* of shares that enhance price efficiency. As a result, price is not likely to meaningfully deviate from Net Asset Value (NAV.)

On the other hand, unlike *open-end* mutual funds, which provide liquidity (ensure NAV to investors who want to realize their shares) at the *end* of each trading day, the ETF shares are *traded throughout the day* on an *exchange*.

In addition, in contrast to open-end mutual funds, ETFs do not sell or redeem their *individual* shares at NAV. Instead, institutional investors can purchase and redeem *blocks of shares* directly from the ETF company. These large blocks are called *"creation units"*. Creation and redemptions of these units is generally in kind, with the institutional investor contributing or receiving a basket of securities of the *same type and proportion* held by the ETF.

The ability to purchase and redeem creation units gives ETFs an *arbitrage mechanism* which minimizes the potential deviation between the ETF market price and the NAV of the ETF shares.

Since ETFs are *transparent* portfolios, institutional investors can know exactly what assets they must accumulate in order to create an ETF share. In case of a strong demand for an ETF, its share price might rise above its NAV, giving arbitrageurs an opportunity to purchase the *underlying* assets in the market (for example: stock exchange), accumulate proportional ETF composites and then apply to the ETF company to use these portfolios to create new ETF shares. The additional supply of ETF shares will reduce the ETF price, and therefore eliminate the premium over NAV.

A similar process applies when there is a weak demand for an ETF and its shares trade at a discount from NAV. In this case, arbitrageurs will buy ETF shares and apply to the ETF company to redeem them to individual stocks (converting the ETF share to the actual ETF holdings). Then, individual stocks will be sold separately for profit (since they were bought for less than NAV). The lower supply of ETF shares will increase the ETF price, and so eliminate the discount over NAV.

This act of exchange disseminates the *updated NAV* of the shares throughout the trading day.

This arbitrage opportunity is especially compelling in regard to Pure Property and its hedging prospects.

As we witnessed in previous chapters, synthetic financial instruments (derivatives) were constructed to answer the demand for real estate risk management. While past products differed in format, quality and class, being based on *information* indices, they all suffered from a *limit to arbitrage*. This limit to arbitrage increased derivative price inefficiencies, which in turn, caused liquidity problem that put the viability of these derivatives under a question.

As reviewed earlier, Pure Property benefits from several major advantages over the past products, including its updated valuation system, functional versatility, tailored exposures, liquidity and lower credit risk.

We think that Pure Property's format as a *transparent ETF* could be a very important lead over past derivatives.

As we were told by prominent traders, ETFs are a growing and attractive field for both investors and arbitragers. While (particularly passive) investors are attracted to ETFs for their transparency, liquidity and efficiency as well as convenience, the opportunistic investors follow a classical, pure arbitrage play.

As opposed to the synthetic derivatives world, in which opportunistic traders are being scrutinized for having uncompetitive advantage and being responsible of an unknown credit risk, in the ETFs arena, opportunistic arbitragers are welcome for their contribution to market efficiency. In fact, they are perceived as those who provide liquidity to private and institutional investors.

These divergent perceptions might have important implications on future regulation. As we learnt in the past, regulation has a crucial influence on the activity of financial derivatives.

Therefore, we see *a great business potential* in the Pure Property products as, real estate investing and property hedging, instruments.

5. Summary

Many investors recognize the long term benefits of investing in real estate. However, a common concern about this type of investment is its *illiquidity*. Institutional investors who directly invest in properties find it difficult to manage the risks of "hard assets". On the contrary, new standardized and liquid property exposures could offer investors advanced hedging tools that will attract more investors to this asset class. These potential synthetic exposures are real estate derivatives.

Founded on a series of interviews with leading market insiders, we studied the development and structure of *past* real estate *equity* derivatives. We reviewed housing and commercial products, utilizing various index methodologies and trading domains. We characterized each product and analyzed its unique value proposition. We showed how the derivative *structure* and *trading zone* played a crucial role in the performance of these new products.

Then, we discussed real estate *debt* derivatives and their special functions. We distinguished between the use of debt and equity derivatives. In addition, we investigated recent regulatory acts in the field of structured finance and their implications on the development of future real estate hedging tools.

At last, the paper introduced Pure Property, a new, liquid commercial real estate derivative. We presented Pure Property's new concept, using REITs pricing as a proxy for commercial real estate prices and discussed the product's approach in regard to valuation, product functionality and trading liquidity. The paper explained the major contribution of the ETF model to the enhancement of arbitrage activity and investing according to modern portfolio theory. We concluded the paper with our prediction that Pure Property is likely to establish a liquid and reliable commercial real estate investing and hedging tool.

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