Property Derivatives and the Subprime Crisis

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Keywords: Risk Management, Portfolio Management

Abstract
The recent real estate bubble was fuelled by non-risk adjusted lending policies, low interest rates and complex finance vehicles. Mortgage-backed securities (MBS) played a crucial role in the crisis. These vehicles were praised as liquid capital market instruments that allowed mortgage lenders to replenish their funds, which could then be used for additional origination activities. However, in some forms, securitized mortgage pools are highly complex and hard to price. It turned out that MBS were not able to deal with the risks of the real estate market appropriately. The painful burst of the real estate bubble highlights the urgent need for instruments that provide more transparency and allow better mitigating of both house price and commercial property risk. Property derivatives, currently emerging in the US and the UK, address real estate prices directly and make them more transparent. Thus, they facilitate a more efficient risk allocation. We illustrate the possibilities and limitations of property derivatives with respect to the current subprime crisis.

Keywords: subprime crisis, real estate bubble, property derivatives, predictive power, efficient risk allocation, Halifax House Price Index

1. The subprime crisis chain of events
The roots of the US subprime crisis date back about a decade. A loose monetary policy characterized by low interest rates made debt financing generally attractive. In addition, housing programs for low-income or "subprime" borrowers, requiring virtually no home equity and only little documentation, were initiated. The Fannie Mae Corporation, under pressure from the US government, was easing the credit requirements on loans that it purchased from banks and other lenders in a nationwide program. The result was, as intended, a significant increase in housing affordability and homeownership rates.

As a consequence of the increased demand, prices began to rise. Between 1996 and 2006, American house prices almost tripled, according to the S&P Case-Shiller House Price Index. Naturally, builders were prompted to construct more homes, satisfying the excess demand. In 2005, housing starts were twice as high as in 1990.

Also, as mortgage markets have become more competitive, banks have increasingly used brokers to outsource the job of finding and qualifying borrowers. As a broker is incentivized by sales volume and does not take any credit risk, the way for mispricing was eased. In 2004, there were about 53,000 mortgage brokerage companies that employed an estimated 418,700 agents and originated 68% of all residential loans in the US.1

Meanwhile, investment bankers worked on the mortgage pool structures. Subprime loans, originated by the brokers, were bundled by mortgage lenders and sold to investment banks, in the form of mortgage-backed securities (MBS). By 2006, MBS accounted for more than 20% of all US residential mortgages.2 These MBS were then used to create collateralized debt obligations (CDOs). About two thirds of all securitized US mortgages were sold to investors, while the remaining third – about USD

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1 According to a 2004 study by Wholesale Access Mortgage Research & Consulting
2 Credit Suisse Research and IMF, 2008
3.5 trillion – was kept on the bank’s balance sheets. These assets, combined with increased leverage, boosted banks’ profits and return on equity – a measure eyed by many analysts. Eventually, in the summer of 2006, the result of uncontrolled overbuilding during the boom period led to a surplus inventory of homes. Vacancy rates in the residential market rose to almost 3%, compared to a long-term average of 1.5%. This excess supply placed downward pressure on prices, and refinancing became more difficult, a problem amplified by simultaneously rising interest rates. Lenders needed to revalue their assets, and mortgage rates were reset at higher levels. Subsequently, borrowers began defaulting, triggering a feedback loop: the increased number of foreclosed mortgages drove housing prices further down, requiring lenders to revalue their assets and rates again. In August 2008, 30% of US homeowners who bought their house after 2002 exhibited negative home equity.

The speed of the market downturn took everyone by surprise. Normally, housing is characterized by sticky prices, i.e. prices are slow to respond to a downturn because homeowners tend to wait with a sale if they cannot get the price they want. During the current downturn however, house prices have fallen sharply because of the numerous foreclosure sales, where homeowners do not have the option to wait. This sudden drop in prices and valuations made it even harder to absorb the losses by home equity or in balance sheets of lenders and banks.

So far so bad, but then it got worse. As the ultimate MBS investors were disconnected from the ultimate mortgage borrowers, investors needed to rely on ratings. However, rating agencies underestimated the market risk contained in the numerous new and complex structures. The more layers in a structured credit vehicle, the more exotic its loss distribution. If the first layer of assumptions is wrong, then a third level structure will quickly collapse under pressure. Since the first layer – the process of origination – was outsourced to brokers that take no risk, assumptions could easily go wrong.

Thus, after years of strong growth of the MBS markets, risk premia increased significantly. The lack of transparency of the vehicles and the previous dispersion of the risks throughout the financial system led to a crisis of confidence in the valuation of the vehicles, and no one knew to what extent individual banks were affected. These uncertainties were aggravated through the repeated downgrading of the credit vehicles’ ratings. The loss of confidence, coupled with the high leverage in the system, led to a collapse of liquidity in most MBS and related markets.

2. The role of property derivatives
The property derivatives market offers plain vanilla derivative contracts such as put and call options, forwards and futures, and swaps. The contracts are based on both commercial and residential property indices; either calculated as price indices or, including rental income, as total return indices. The indices are based on arm-length property transactions or on appraisals. To avoid index distortions that would arise from a change in buyers’ preferences, there is a statistic control for location, age, size and further attributes of an object. The result is a constant-quality index, representing the median house in the respective market. For use as risk management tools, property derivatives have three major advantages compared to MBS: transparency, allocation efficiency and liquidity.

3.1. Transparency: A main reason why real estate downturns often result in heavy recessions is – in combination with the market’s vast size – the market’s lack of transparency. The uniqueness of individual properties complicates their comparability and slacks owners’ risk awareness. In MBS, housing risk is only one risk component, along with default risk. In contrast, property derivatives explicitly focus on property market risk. The underlying instrument of a property derivative is not a pool of loans collateralized by houses, but a housing index that tracks house price development directly. Thus, as market risk is isolated – not mixed and squared as in MBS – property derivatives provide a higher level of transparency, improve risk awareness and provide a more robust price discovery.

3.2. Allocation efficiency: Transparency is a necessary but not a sufficient condition to achieve an efficient allocation of risk. A further condition is the availability of a risk management toolbox that
allows hedging against rising or falling prices. While physical properties cannot be sold short, property futures, forwards and swaps offer this possibility, enabling property funds and even homeowners for the first time to hedge against adverse house price development.\(^6\) Options complete the toolbox and allow individual risk profiles to be accurately addressed. However, if there is a price bubble that bursts, someone has to take the loss. Property derivatives cannot avoid the aggregated loss, but allow better allocating risk and returns.

### 3.3. Liquidity:

As property derivatives are standardized, trading volume is concentrated in a small number of fungible contracts. In the heterogeneous market for physical properties and for MBS, liquidity typically evaporates in a sharp downturn. In Q2 2008 for example, transaction volume for UK commercial properties tumbled to GBP 6.1 billion, a 60% drop from the previous year.\(^7\) According to a survey by CB Richard Ellis, investors are waiting to see how far values fall.\(^8\) Further, the Royal Institute of Chartered Surveyors (RICS) reports a collapse in housing transactions, mainly due to the inability of many to secure mortgage finance.\(^9\) Time-on-market for housing more than doubled compared to the previous year. Finally, liquidity in the MBS market globally collapsed in 2008. At the same time, the nascent property derivatives market did not dry up but reached record trading volumes.

Liquidity in turn further contributes to information availability and market transparency: only in liquid spot markets, transaction prices always reflect true market conditions.\(^10\) Compared to MBS or physical properties, property derivatives can provide great help in depicting market prices and expectations.

### 3. Predictive power of property derivatives

Most market observers in the UK agree that house prices are likely to continue to fall over the next few months. While the housing market is inert and consolidation is slow, property derivatives on the Halifax House Price Index predict already a 50% drop from the peak in early 2007.\(^11\) According to the implied price development, the bottom will be reached in 2010 to 2011. But forward prices did not always look that grim. In May 2007, the property derivatives market predicted a soft landing without housing deflation. Since then, optimism gradually vanished, as Figure 1 shows. But even if current predictions of a sharp market correction materialize, house prices will still have grown much faster than the overall consumer price index. Thus, housing would still account for consumption share that is much larger than a decade ago.

[Insert Figure 1 about here: The Halifax House Price Index, its forward prices and UK inflation]

### 4. Impact of property derivatives on the subprime crisis

Do property derivatives actually provide the benefits described above in the current subprime crisis?

In most markets, including the US, the market for property derivatives is still in a nascent stage. Few property portfolios managers make use of the new instruments, as most of them do not feel familiar with derivatives. But while only a mere part of real estate exposure is hedged, speculators started anticipating a market downturn and tried to exploit arbitrage between MBS, REITs and property derivatives. In fact, hedge funds were an important source of liquidity in the property derivatives market.

In the UK, where the market is most developed, H1 2008 turnover for commercial property derivatives reached a respectable 38% of the deal volume transacted in the base market.\(^12\) However, the outstanding notional value of these derivatives still accounts for only roughly 1% of the size of the UK commercial investment market. The market size for residential property derivatives is estimated to be smaller, but no official figures are disclosed. At this stage, property derivatives will fail to effectively mitigate property risk. There is still a long way until their market potential is reached. Equivalent to

\(^6\) See Syz et al. (2008)  
\(^7\) Lambert Smith Hampton, Economic & Property Market Bulletin, August 2008  
\(^8\) CB Richard Ellis/Property Week, 2008  
\(^9\) RICS Housing Market Survey August 2008  
\(^10\) See Fisher et al. (2003)  
\(^11\) Property derivative quotes are obtained from the brokerage firm Tradition Financial Services  
\(^12\) According to Investment Property Databank (IPD) and Lambert Smith Hampton, Economic & Property Market Bulletin, August 2008
today's proportions for equity derivatives, the potential is estimated to be about 35–40% of the base market size.\textsuperscript{13}

However, although the property derivatives market is still small, its effect on the subprime crisis is already valuable. First, property derivatives might accelerate the market clearance. Forward prices reflect, in equilibrium, the expectations of the market. In doing that, they are much more timely and realistic than forecast surveys and thus catalyse more realistic valuations. Figure 2 contrasts the Investment Property Forum (IPF) four-year consensus forecast as of 2006 from returns implied by property derivatives at that time.\textsuperscript{14} Analysts and appraisers tend to adjust their estimates much more slowly than the market.

Moreover, investors have the possibility to hedge their property exposure right away, locking in the price level that is implied by the derivative price. If this level is lower than the currently accounted value, there is an unpleasant immediate write-off, but in return the property position is protected against a market downturn. Without such a hedge, property losses typically occur gradually, arousing fear and uncertainty. Deferring or even neglecting the scale of a crisis can be dangerous, as necessary actions might not be taken in due time.

Finally, markets can benefit from the short-sale possibilities of property derivatives. If short-sales are constrained, a few irrational investors can cause assets to be overpriced, keeping prices from adjusting to equilibrium levels.\textsuperscript{15} Without constraints, informed traders would prefer to sell an overpriced asset short, expecting to profit when the price returns to equilibrium. With short-sale restrictions, any deviation from equilibrium can persist longer, impeding timely price discovery. As property derivatives for the first time introduces short selling in the real estate market, they could help attenuate irrational price bubbles.

In summary, the current subprime crisis is marked by aggressive banking practices coupled with poor transparency that led to excessive risk-taking. While property derivatives are not immune against abuse, they offer some significant benefits regarding transparency and provide new ways of risk management in the real estate market. Hence, an established property derivatives market will allow us to better cope with the next property slump.

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[Box] Why not take REITs instead?

REITs can serve as indicators for a downturn in the real estate market. In fact, the EPRA/NAREIT UK Index started to fall in spring 2007, at about the same time forward prices of property derivatives reversed. However, there are some strong arguments that make REITs less suitable than property derivatives as transparency providers and risk management tools. First, the performance of REITs is influenced by management skills as well as by debt level and associated interest rate risk. Second, equity REITs do not cover the market for owner-occupied housing, which is the basis for residential mortgages that triggered the crisis, and mortgage REITs behave according to their asymmetric payout schemes and face similar shortcomings as MBS. Third, REITs are exposed to the moods of the equity markets, so they often exhibit a large premium or discount to NAV. Property derivatives on the other hand always pay the exact index return at their maturity.
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References
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\textsuperscript{13} Geltner, MIT/CRE 2007
\textsuperscript{14} Merrill Lynch Property Derivatives Handbook, 2006
\textsuperscript{15} See, e.g., Jones and Lamont (2001)
Figure 1

Figure 2