The Housing Futures Market

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Abstract:

The Chicago Mercantile Exchange (CME) in May 2006 began trading housing futures contracts and options, in response to the growing concern with housing risk. This paper reviews the development and operation of the CME housing futures market. The findings indicate that speculators earn significant risk premiums for assuming the risk of future fluctuations in housing prices. These returns and risks, however, appear to be substantially different than the risks and returns earned by those who invest in housing directly. The CME housing futures market offers a way for individuals, businesses, and others to transfer housing risk, which would seem to be important given the importance of housing to household wealth and the overall economy, but low trading volumes indicate that few have been willing to utilize this mechanism.

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Article:

In 2006, the value of residential real estate in the United States totaled $22.4 trillion. Residential housing comprises 39% of household assets, and households have more invested in residential property than in stocks, bonds, and mutual funds combined.

After rising more than 11% per year from 2000 through 2006, housing prices turned downward, bringing rising defaults, foreclosures, and financial stress. The housing bust caused a reevaluation of the risk of housing investment, as it became increasing recognized that the price risk facing homeowners, lenders, and other market participants is high and varies widely across the country (Jud, Roulac, and Winkler, 2005).

In recognition of the growing concern with housing risk, the Chicago Mercantile Exchange (CME) in May 2006 began trading housing futures contracts and options. Housing, thus, joined a long litany of other commodities and financial instruments on which hedgers and speculators can exchange standardized contracts for future delivery.

The CME housing futures contracts are based on the S&P/Case-Shiller® Home Price Indices, which are tabulated monthly for ten major cities and a composite index for the nation. The ten cities for which contracts trade are Boston (BOS), Chicago (CHI), Denver (DEN), Las Vegas (LAV), Los Angeles (LAX), Miami (MIA), New York (NYM), San Diego (SDG), San Francisco (SFR), and Washington, DC (WDC). The national composite index trades under the symbol CUS.

This paper reviews the development and operation of the CME housing futures market. The first section looks at the evolution of futures trading. Section two examines the S&P/Case-Shiller Home Price Indices and the trading in CME housing futures products. Section three reports trends in trading volumes. Section four explores the rationale for trading housing-related futures and options. Section five discusses theories of futures pricing. Section six reports past studies of housing futures risks and returns. Section seven provides new evidence of the risks and returns of housing futures. This section examines the relationship between the returns to investments in futures and investments in housing itself. And it looks at the usefulness of futures prices as predictors of future housing prices. The final section summarizes relevant findings and lays out avenues for further research.

The Evolution of Futures Trading

A *forward contract* is an agreement between two parties to buy and sell a specific quantity of a commodity at some date in the future. The quantity of the commodity, the grade, the time and place of delivery, and the price are all specific to the particular contract. In contrast, a *futures contract* is a forward contract in which the quantity, the grade, and the time and place of delivery are all specified and guaranteed by the exchange on which the futures contract trades. With a forward contract, if one of the parties fails to perform, the other party has no remedy beyond legal action against the defaulting party. With a futures contract, the exchange guarantees that each party will perform, and the exchange stands ready to make the contract good should one of the contracting parties default. This means that buying and selling futures contracts becomes impersonal. The contracting parties need not know or trust each other; all that is necessary is that they know and trust the exchange on which the futures contract is traded.

Historians have traced the trading of forward contracts back at least to the 1600s when merchants in Amsterdam and London traded tulips, grain, herring, and securities for future delivery. Williams (1982) reports that forward contracts in agricultural commodities were widely traded in New York City and other places in the U.S. during the 1840s.

The Chicago Board of Trade (CBOT), the nation’s oldest futures exchange, established formal trading rules in 1865. The New York Cotton Exchange was incorporated in 1870. As the country grew and developed, so did trading of futures contracts. Carlton (1984), drawing on information from *The Wall Street Journal*, finds that in 1921, 15 different commodities were being traded on 34 separate exchanges. By 1983, 42 different types of commodities were being traded on 53 listed markets. Today, hundreds of different types of futures contracts involving commodities, currencies, debt instruments, equity instruments, and real estate are traded on major futures exchanges across the globe.

Several attempts have been made to initiate futures trading in instruments related to real estate. A Consumer Price Index (CPI) futures market, first proposed by Lovell and Vogel (1973), was introduced on the Coffee, Sugar, and Cocoa Exchange in 1985. However, the new futures contract did not attract sufficient investor interest and trading was ended in 1989 (Horrigan, 1987).

Karl Case, Allan Weiss, and Robert Shiller started the Case Shiller Weiss Research Group in June 1990 and presented the Coffee, Sugar, and Cocoa Exchange in August 1990 with the idea of launching a futures market on single family homes (Shiller, 2008). In November 1990, the Chicago Board of Trade (CBOT) was presented with a similar idea. An alliance of Case Shiller and Weiss, Inc. and the CBOT studied the possibility of launching a home-price futures market. The CBOT surveyed potential traders in 1993 and found that there were many more people willing to sell real estate futures than buy them. The CBOT ultimately decided not to launch home-price futures.

The London Futures and Options Exchange (FOX) began trading in four real estate futures contacts in May 1991. The four contracts were: (1) a housing contract, (2) a mortgage interest rate contract, (3) a commercial real estate contract, and (4) a commercial real estate rent contract. The housing futures contract was based on the Nationwide Anglia Building Society house price index (NAHP), which was published monthly. The NAHP index was based on data from home sales on which the Nationwide Anglia Building Society issued mortgage loans. The index was quality adjusted using multiple regression analysis to control for changes in housing characteristics over time. Patel (1994) reports that the FOX contracts failed to attract economically viable trading volumes. Shiller (2008) suggests that the demise of the market was more likely due to efforts to pad volume by doing wash trades, and that when discovered, the markets were shut down because of the scandal. The contracts were discontinued in October 1991.

As home prices increased in the late 1990s, people became more interested in speculation in home values. Several spread betting markets opened thereafter. City Index launched a spread betting market for single family homes in 2001, and IG Index started a home price spread betting market a year later. Although these markets have since shut down, new ones continue to open. Cantor Index launched spread betting on the Average Greater London and Average UK House Price markets in May 2005 (spreadfair.com). An annual commission charge is levied once a year, deducted from the average open position, in addition to the 3% – 5% of net winnings on the market, applied at the time of settlement.

In October 2004, futures contracts linked to home prices were introduced by HedgeStreet (De Aenlloe, 2004). The contracts were designed to be traded on line by small investors. The small investments called ‘‘hedgelets’’ were bets in $10 increments on the future direction of housing prices. The contracts were yes-or-no wagers that the Office of Federal Housing Enterprise Oversight (OFHEO) index in one of six cities would be in a certain range on a given date over the next three months. At maturity, the losing bets expired worthless and winners collected premiums. The contracts proved not to be popular enough to justify their continuation, and trading was halted.

The Chicago Mercantile Exchange collaborated with MacroMarkets LLC to launch futures and options markets based on the Case-Shiller Indices in 2006, and Standard and Poor's acquired the S&P/Case-Shiller Home Price Indices of MacroMarkets LLC in February 2008.1 The CME trades futures and options using the S&P/Case-Shiller Home Price Indices (CSI) for 10 MSAs and a composite index of the 10 MSAs.

Commercial real estate indices have begun to evolve. The Investment Property Databank (IPD) began to be used for derivative products such as property swaps. IPD grants licenses to banks to use their intellectual property. The initial series started in January 2005. Investors can change their exposure to property returns by buying or selling contracts. Trades have been completed on Australian, Canadian, French, German, Italian, Japanese, Spanish, and Swiss indices. By the end of 2008:2, £17.3 billion of swaps referenced the U.K. indices alone.

Standard and Poor's and Global Real Analytics/Charles Schwab Investment Management developed the S&P/GRA Commercial Real Estate Indices (Labuszewski and Souza, 2007). The CME announced in November 2007 that it would use the S&P/GRA Commercial Real Estate Indices for a new futures product. The commercial real estate futures would be traded in office, warehouse, apartment, and retail property sectors, and be available for the nation, Northeast, Midwest, mid-Atlantic South, Pacific West, and Desert Mountain West regions, with electronic trading out 20 quarters. As with housing price futures, they are cash settled. Unlike CME housing futures, however, the S&P/GRA is not a repeat sales index, but uses a weighted average transaction price per square foot. Trading in S&P/GRA commercial real estate index futures been very sparse.[2]

In 2008, MacroMarkets filed with the Securities and Exchange Commission to offer exchanged-traded securities linked to the S&P/Case-Shiller Composite 10-City Price Index. The securities will allow investors to bet on the direction of home prices. Two securities will be traded on the New York Stock Exchange: MacroShares Major Metro Housing Up (UMM) and MacroShares Major Metro Housing Down (DMM).[3]

The S&P/Case-Shiller Home Price Indices Futures and Options

The S&P/Case-Shiller Home Price Indices, developed by Karl E. Case and Robert J. Shiller (1987, 1989), reflect residential price movements across Metropolitan Statistical Areas (MSAs).

The indexes track changes in existing home values in 20 MSAs and two composite indexes, composed of a group of 10 and 20 MSAs respectively. The indexes are formulated using a methodology that involves repeat sales of residential properties. Sales pairs are screened to avoid foreclosed properties, non-arms length transactions, and suspected data errors. The repeat-sales pricing method is a quality-adjusting technique (Case and Shiller, 1987, 1989). Fluctuations in price because of remodeling, additions, or extreme neglect are minimized by assigning a smaller weight to sales pairs with a large change in sales price relative to properties in the surrounding community. Monthly updates are published with a two month lag. Updates are released on the last Tuesday of every month at 9:00 a.m. Eastern Standard Time.

The S&P/Case Shiller Indices (CSI) are produced by Fiserv, Inc., the company that purchased Case Shiller Weiss in 2002 and which also tabulates indices covering thousands of ZIP Codes using the Case-Shiller methodology. Exhibit 1 plots movements in the 10 Home Price Indices from January 1987 through May 2008.

Exhibit 2 shows the average annual percentage changes in the 10 metro indexes. The extent of the housing bubble during the first half of the decade and the subsequent collapse are clearly apparent.

The contract specifications for the CME housing futures are shown in Exhibit 3. The value of the futures contracts are set at 250 times the level of the CSI. Thus, if the level of the composite index (CUS), for example, is 250, the value of the associated futures contract is $62,500 (250 x $250). At maturity, the contract's value is 250 multiplied by the average value of the index over the three-month period ending two calendar months prior to the contract month. For example, the final settlement price for the August 2008 CUS index futures contract is the CSI as reported for the three month period April 2008 through June 2008. The June 2008 index is released in August 2008.[4]

Most securities, like stocks, are priced in standard currency units, like U.S. dollars. Stocks on the New York Stock Exchange, for example, move in one penny increments. Futures contracts, however, move in minimal increments called ''ticks.'' The value of a tick is different depending on the futures contract that is being traded. The tick value for a CSI futures and options contract is 0.20 of an index point. Thus, the value of a tick is $250 times 0.20 = $50.00 per contract. If the current value of the contract is trading at 295.50, an upward move of one tick would take the price to 295.70, and the value of the contract would rise by $50 (295.70 x $250 - 295.50 x $250 =$50). In this case, the long position would be credited with a $50 gain and the short position with a $50 loss.

If a trader buys a futures contract, he establishes a *long* position, where he gains if the price rises and loses if the price falls. If he sells a contract, he has a *short* position, where he gains if the price declines and loses when the price rises. The *open interest* in the futures market is the total number of contracts, long or short, that have been traded and have not yet matured or been closed through a closing transaction. A closing transaction occurs when a trader who holds a long contract sells and closes the position, or when a trader who is short buys to cover the position. Each open contract is created by a buyer (the long position) and the seller (the short position), but the calculation of open interest counts only one side of the contract, that is, the total number of contracts outstanding at any one time.

The CME does not require that traders put up the full value of a contract when buying or selling. It does require a performance bond, or a margin deposit be made to each trader's account. The amount of the performance bond can vary according to the contract being traded. Because the performance bond required is only a fraction of the value of the contract being traded, traders can utilize leverage that enables them to control a substantial amount of product by pledging only a small percentage of its value.[5]

Exhibit 1 S&P/Case-Shiller Home Price Indices (January 1987–May 2008)

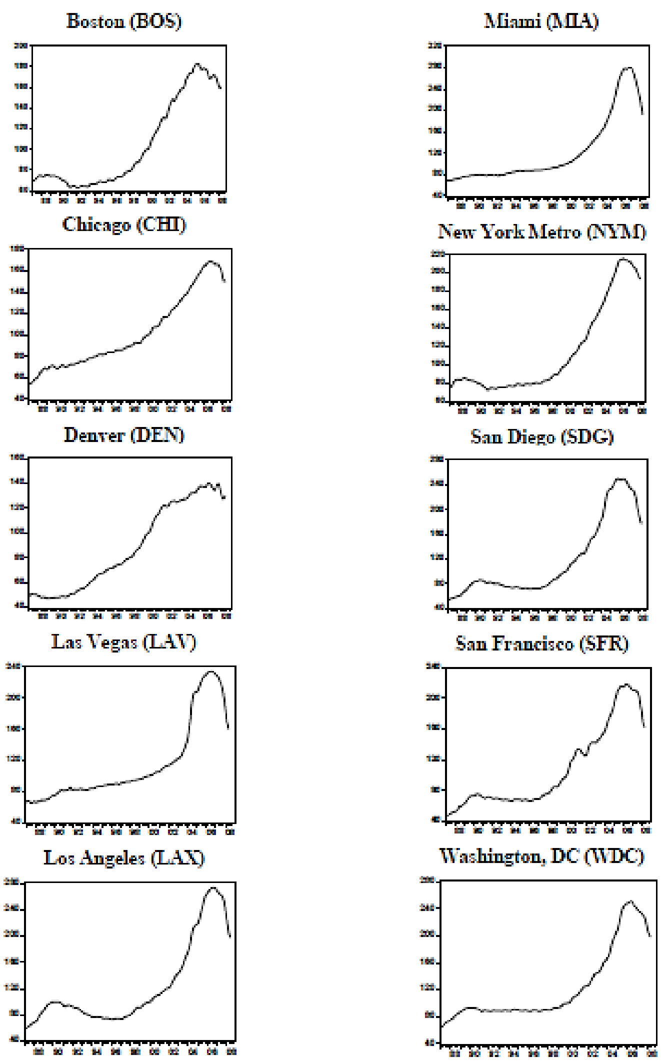


Exhibit 2 S&P/Case-Shiller Home Price Indices (Average Annual % Changes)

MSA	Jan. 87–Dec. 99	Jan. 00–Dec. 06	Jan. 07–May 08	Jan. 87–May 08
BOS	2.7%	7.6%	-3.4%	3.9%
CHI	4.8%	7.4%	-7.8%	4.8%
DEN	5.3%	4.5%	-3.3%	4.4%
LAV	3.1%	12.1%	-25.1%	4.1%
LAX	4.0%	14.3%	-21.1%	5.7%
MIA	2.9%	14.8%	-25.8%	4.9%
NYM	2.2%	10.9%	-6.5%	4.5%
SDG	4.6%	12.5%	-20.1%	5.5%
SFR	5.8%	10.8%	-18.5%	5.9%
WDC	3.4%	12.6%	-12.7%	5.3%
CUS	3.5%	11.5%	-13.9%	5.0%

CSI futures prices can rise and fall continuously over the day as trading moves prices up and down. The value of a trader’s position changes as prices change. The CME marks all positions to market twice each day. The exchange determines a price for each contract, and each trader’s position is valued using the corresponding prices for the various contracts in the trader’s account. If the value of the trader’s account falls below a minimum level, the trader is required to deposit more money if he or she wishes to continue trading, if not, the exchange closes the account by selling off the trader’s positions.

The price that the exchange uses to mark a position to market is called the *settle price*. The CME establishes the settle price in accordance with its Rule 813.6

Trading Volumes

Futures exchanges like the CME are money-making enterprises so the futures contracts they trade must have sufficient demand to warrant the costs of trading. Trading volumes in CME housing futures have been low since the initiation of trading, and volumes over the 2007–2008 period are much lower (Exhibits 4–6). For example, average trading volume during the first nine months of 2008 was down 59% from the same period in 2007, and average open interest was 70% below what it was in 2007. During the first nine months of 2008, open interest averaged just 1,583 contracts.

From the initiation of trading in May 2006 through September 2008, a total of 7,579 housing contracts have traded on the CME (Exhibit 6). The largest number were for Miami (1,278) followed by Los Angeles (1,143), and New York (1,002). The least popular contracts were Denver (232) and Chicago (259).

Exhibit 3 CME Housing Futures Specifications

Specification	Definition

Contract Size	$250 multiplied by the Case-Shiller Home Price Index (CSI).
Minimum Price Fluctuation	Increments of 0.20 or $50.
Contract Months	February, May, August, November (February Cycle).
Cash Index Release Schedule	The last Tuesday of every calendar month at 8:00 a.m. CST.
Last Trading Day	Trading ceases at 2:00 p.m. CST on the business day preceding the index release day for the contract month.
Contracts Available	Boston (BOS), Chicago (CHI), Denver (DEN), Los Angeles (LAX), Las Vegas (LAV), Miami (MIA), New York (NYM), San Diego (SDG), San Francisco (SFR), Washington, DC (WDC), and the 10-city composite index (CUS).
Type of Trading	Futures, options on futures, block trading (20 contract minimum), calendar spreads, regional spreads.
Settlement	Contracts are settled against the spot value of the S&P/Case-Shiller® Home Price Index (CSI) with a two-month lag using the index values for the previous three months (previous quarter).
Trading Hours	Offered exclusively on the CME Globex® electronic trading platform on Sunday–Thursdays 5:00 p.m.–2:00 p.m. (CST) the next day.
Minimum Performance Requirements	Depends on volatility of the housing market, purpose of the futures trade (speculative or hedging), and if the position is an outright position or a spread.
Position Limits	5,000 contracts.

Source: Housing Futures and Options: Contract Specifications. CME, May 2006.

The trading in housing futures contracts has been miniscule compared to the volume of other contracts traded on the CME. There were just 2,935 housing contracts traded during all of 2007, compared to the total CME trading volume of 2.2 billion contracts during 2007.[7] The low popularity of housing futures trading makes the longer-term sustainability of the market an open question.

From the initiation of trading through September 2008, the ratio of average open interest to trading volume was 14.2, suggesting that the average holding period for a housing futures contract was 14.2 months. The long average holding period indicates that most housing futures contracts are held as part of a buy-and-hold strategy, in contrast to an intra-day trading strategy that is typical of more popular futures markets.[8]

Shiller (2008) suggests that the low volume is the result of a dearth of market makers committed to the CME real estate futures market and the consequent lack of liquidity reflected in high bid-ask spreads. John Labuszewski (CME Group) explains the difficulties faced by market makers because of the unavailability of highly-correlated markets against which market makers can lay off their risk.[9] According to Labuszewski, market makers often attempt to close their books at the end of a trading session with no outstanding long or short positions. Ideally, they try to lay off any net long or short position at the end of the day by taking an opposite position in a related market. Their business model is to profit from the bid-ask spread and remain unexposed to risk, but because of the lack of highly-correlated and liquid markets this has not been possible in housing futures. Consequently, the bid-ask spreads in the market may be at levels that discourage extremely active trading in favor of a buy and-hold approach. Of course, market makers could attempt to adjust spreads to attract a greater volume of customer orders, but this is problematic in a nascent market with limited or sporadic customer order flow.

Exhibit 4 CME Housing Futures, Monthly Trading Volume (May 2006–Sept. 2008)

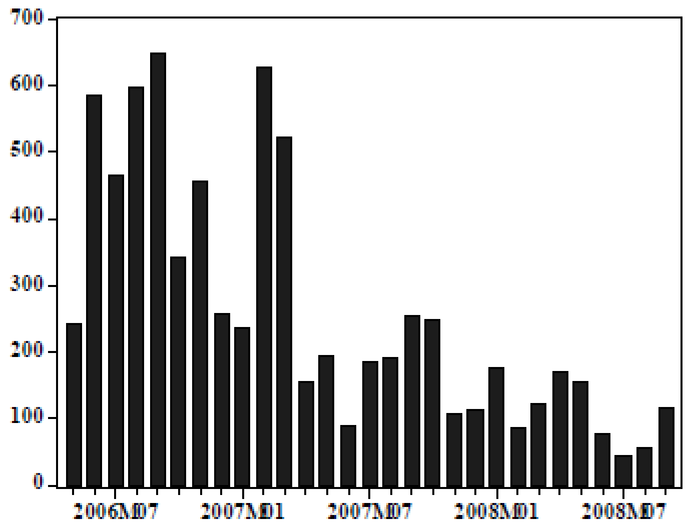


Exhibit 5 CME Housing Futures, Monthly Open Interest (May 2006–Sept. 2008)

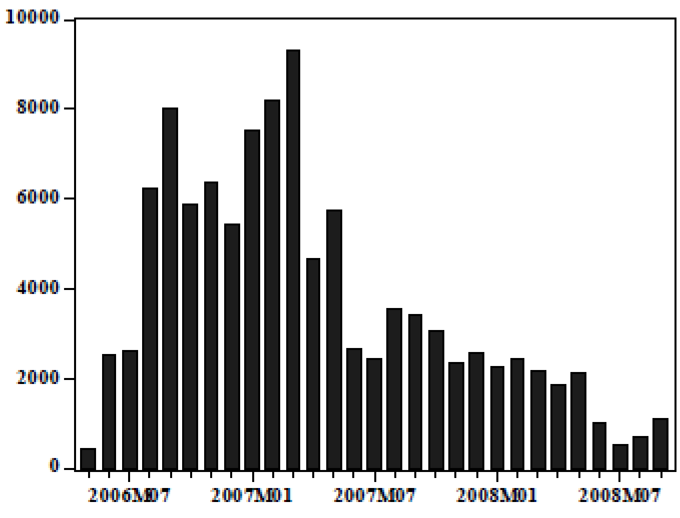
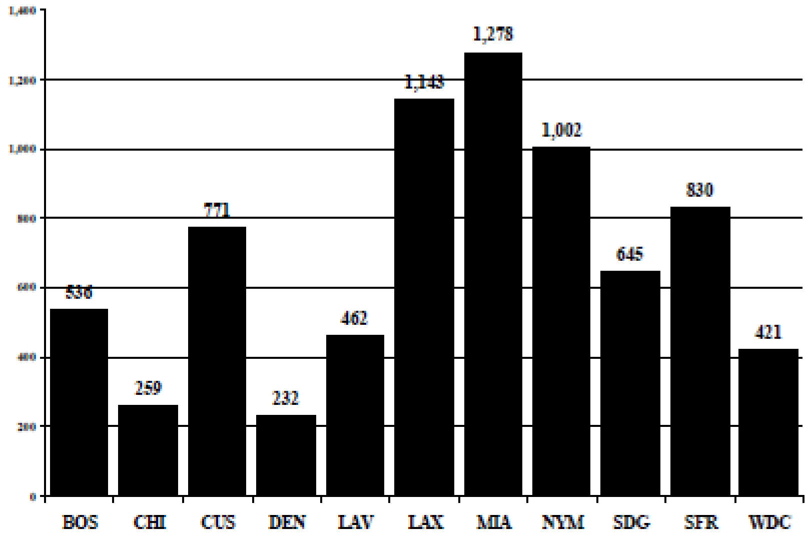


Exhibit 6 CME Housing Futures, Number of Contracts Traded, by MSA (May 2006–Sept. 2008) Why Trade Housing Futures and Options?



It is often argued that CSI futures and options offer exposure to a diversified single family housing portfolio without the costs of direct investment in the housing sector. The average returns and standard deviations of investments in a portfolio of stocks (S&P 500), T-bonds, T-bills, and the CSI 10-City Composite Index are shown in Exhibit 7. The returns are calculated using annualized data, 1987–2007. The average annual return and the standard deviation of annual returns for the CSI Composite Index are higher than T-bills but lower than stocks and T-bonds. However, the risk of the housing index, when assessed on the basis of the coefficient of variation (CV) is higher than T-bills, T-bonds, and stocks.

Exhibit 7 Returns and Risks, 1987–2007 (*n* = 21)

	Stocks	T-Bills	T-Bonds	CSI Index
Ave. Annual Return	12.58%	4.77%	7.45%	5.86%
Std. Dev.	16.10%	1.69%	8.58%	7.92%
Coeff. of Variation	1.28	0.35	1.15	1.35

The correlations of stock, T-bond, T-bill, and CSI Composite Index returns are shown in Exhibit 8. The correlations indicate that housing returns are negatively related to stocks, T-bonds, and T-bills.

Portfolio Diversification

Portfolio diversification is another major opportunity possibly afforded investors by the market in CSI futures and options. The risk-return characteristics of housing market investment suggest that housing is influenced by forces that are substantially different from those that affect stocks and bonds (Exhibit 8). Because of this, a number of researchers have suggested that including housing in a portfolio of other assets can improve portfolio performance. Among the many studies in this area, see, for example, Webb (1990), Goetzmann (1993), Englund, Hwang, and Quigley (2002), Eichholtz, Koedijk, and de Roon (2002), and Jud, Wingler, and Winkler (2006).

Large investors who want exposure to housing but who do not want to invest in housing directly could buy housing futures. For small investors, mutual funds or exchange-traded funds (ETFs) might be developed to invest in housing as they have for other commodities like gold, oil, etc. So far, these kinds of vehicles have not been developed for housing futures, which simply may reflect a lack of demand on the part of investors. Tokic and Tokic (2008), however, suggest that the low volume and high bid-ask spreads in the housing futures market currently make this kind of activity very difficult.

Exhibit 8 Correlation of Returns, 1987–2007

	Stocks	T-Bills	T-Bonds	CSI Index
Stocks	1.000	—	—	—
T-Bills	0.248	1.000	—	—
T-Bonds	0.151	0.285	1.000	—
CSI Index	-0.165	-0.386	-0.182	1.000

Hedging

CSI futures and options may make possible a variety of hedging strategies for individuals or institutions wishing to lay off some of their housing investment risk. Businesses or individuals (e.g., developers, builders, mortgage lenders, and others) whose wealth or profitability is linked to housing values may find they can reduce their risk by selling housing futures or buying put options for protection against a fall in housing values. For example, a builder or developer with a large inventory of unsold homes may want to hedge the risk of a fall in prices by going short in the futures market or buying puts on housing futures.

Case, Shiller, and Weiss (1991) and Case and Shiller (1996) explain how mortgage insurers might gain by selling housing futures or buying puts on housing futures to hedge their risk of higher defaults that occur when housing prices fall. Shiller and Weiss (2000) also explain how a housing futures market might make possible the sale of home equity insurance. To do so, an insurance company would need a mechanism to lay off the risk of widespread housing price declines. The existence of a market in housing futures provides an insurance company offering home equity insurance a way to hedge itself against falling housing prices, and it might allow the companies to sell down-payment insurance and price guarantees on new homes (Shiller, 1993). Caplin et al. (2003) describe the development and implementation of a home equity insurance program launched in 2002 in Syracuse, New York. They find that the implementation of the program was feasible.

A problem with these kinds of hedging strategies, as indicated by Tokic and Tokic (2008), is the lack of a large number of buyers for housing futures. As a result, the market has been thin and bid-ask spreads have been high, making a lot of hedging activity too expensive.

Speculation and Price Discovery

Establishment of a housing futures market may provide important information about the future course of actual housing prices. Futures market prices that are established in a well-functioning market reflect the expectations of speculators, hedgers, and other informed investors about the future path of spot market prices. Speculators, for example, buy or sell future contracts depending on their expectations of future spot prices. They hope to profit from their forecasts of future spot prices by buying or selling in the futures market. Competition among competing views of the future means the prevailing prices are a balanced reflection of overall market expectations. Thus, futures market trading provides a continuous and widely-available source of information on the future direction of housing prices, which may prove useful to a wide variety of applications in the larger economy. According to Tokic and Tokic (2008), however, the current housing futures market does not have sufficient liquidity to allow a lot of speculation. Bid-ask spreads are too high for speculators to profit from rapid entry and exit.

The Theory of Futures Pricing

The cost-of-carry model is a theory of futures prices that is often applied to financial futures (Fama and French, 1987). The cost-of-carry model suggests that the futures price will be equal to the spot price plus the cost of carry (storage, insurance, etc.). The linkage between the spot and futures price is thought to derive from the choice of either (1) buying the product on the spot market and carrying it into the future or (2) purchasing a contract for future delivery on the futures market. If the returns from one strategy are greater than another, arbitrageurs are assumed to act to close the gap by buying the spot and selling the future or vice versa. Such arbitrage is relatively easy in financial markets but can be difficult in housing markets especially when closing the gap involves selling the spot market. As a result, the linkage between spot and futures prices is thought to be much looser in housing markets.

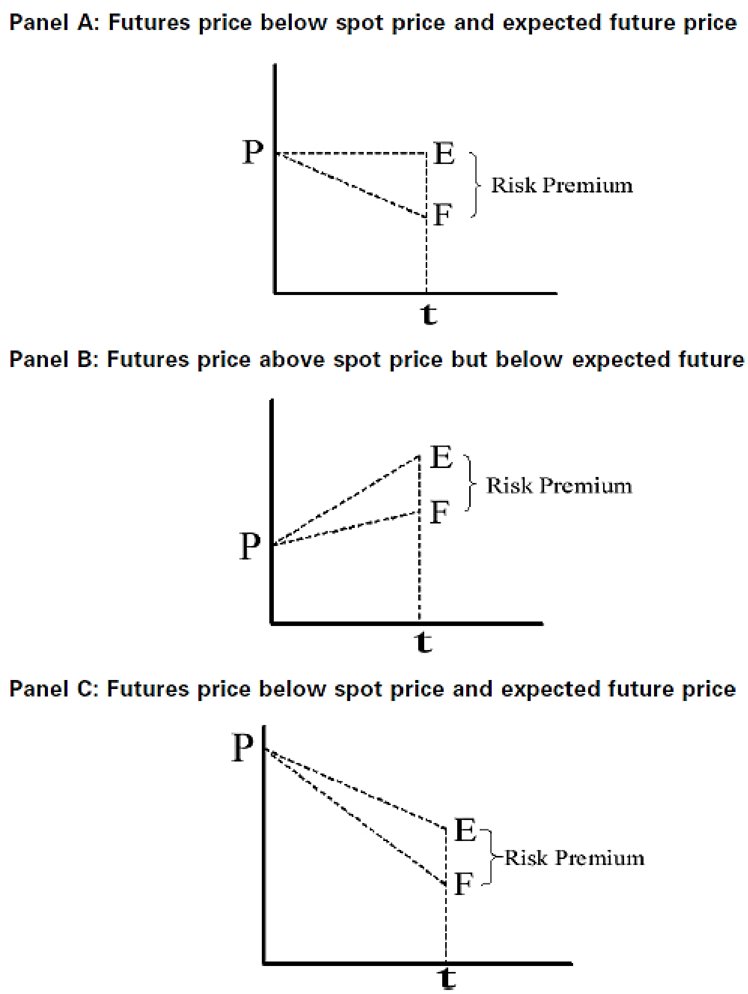
Almost 80 years ago John Maynard Keynes (1930, pp. 142–44) set forth a theory of commodity futures pricing. According to Keynes, the price of a futures contract normally will be set below the *expected* future price of the commodity. The difference between the expected future price and the price of the commodity on the futures exchange reflects a ‘‘risk premium’’ sufficient to induce speculators to assume the risk of future price fluctuations.

Hicks (1939, p. 138) credits Keynes when he discusses futures markets. Hicks asserts that futures prices are nearly always set by speculators ‘‘who seek a profit by buying futures when the futures price is below the spot price they expect.’’ Speculators will only be willing to buy futures contracts so long as the price is below the spot price they expect to prevail in the future. On the other hand, hedgers seek to lay off the risk of future price fluctuations. Therefore, hedgers are willing to accept a price that is below the expected future spot price in order to guarantee a price certain in the future.

Keynes (1930) refers to the difference between the *expected* spot price and the futures price as ‘‘normal backwardation.’’ In market language, there is ‘‘backwardation’’ whenever the futures price is below the current spot price. Alternatively, when the futures price is greater than the spot price, there is ‘‘contango.’’ Hicks (1939, p. 138), however, asserts that even when the spot price is not expected to change, the futures price will be below the spot price by an ‘‘an amount which hedgers have to hand over to speculators in order to persuade the speculators to take over the risks of the price fluctuations in question.’’

Exhibit 9 illustrates the case of ‘‘normal backwardation.’’ In Panel A, the spot price (P) is equal to the expected future price (E), but the futures price (F) is less than (P) and (E) by an amount that reflects the risk premium on futures contracts, or the speculator’s reward for risk.

Exhibit 9 Futures Pricing with ‘‘Normal Backwardation’’ under Alternative Spot Price Expectations



In Panel B of Exhibit 9, the expected future price (E) is greater than the spot price (P), but the futures price (F) is still less than (E) by the amount of the risk premium. Likewise in a falling market, where (E) is less than (P), the futures price (F) will still be less that (E) by the amount of the risk premium, as shown in Panel C. Keynes (1930) speculated that the level of ‘‘normal backwardation,’’ or the size of the risk premium, was about 10% in organized commodity markets.[10]

The Keynesian/Hicks model suggests that speculators will earn a rate of return. They earn this return because they provide the service of taking on the price risk that the hedger does not wish to bear. Permitting speculators to earn a positive rate of return means that the futures price will not normally settle at the weighted average expected spot price. Futures prices will always be downwardly biased estimates of expected future spot prices (Cootner, 1960), and overtime the price of a futures contract will tend to rise as the contract nears maturity.

In contrast to the Keynesian/Hicks model, there is the theory put forward by Hardy (1940). He asserted that for many speculators a futures market offers the same attraction as casino gambling. Instead of insisting on a positive return for taking on the risks of price fluctuations from the hedger, speculators are willing to pay for the privilege of gambling on the exchange instead of in the casino.

A number of empirical studies have examined the size of risk premium in commodity futures markets. Studies by Bodie and Rosansky (1980), Greer (2000), and Gorton and Rouwenhorst (2004) report returns for portfolios of fully-collateralized futures contracts. The contracts are collateralized by investments in T-bills, thus, the reported returns include the interest on the T-bills, as well as the gains or losses from the movements in prices. This is done to control for the effects of leverage and allow comparisons with the returns on other classes of assets.

The studies by Bodie and Rosansky (1980), Greer (2000), and Gorton and Rouwenhorst (2004) report returns and risks on commodity futures that are close to the returns and risks on common stocks recorded for comparable time periods, suggesting that commodity futures and common stocks have about the same risk premiums and levels of risk. The positive return in excess of the risk-free rate lends support to the Keynesian/Hicks model.

Fama and French (1987) examine the returns for 21 commodities from 1967 through 1984. Of the 21 commodities, they find 19 recorded positive returns, and when all 21 commodities are combined into a single portfolio, they find an average monthly return of 0.54% (6.5% annualized). The authors conclude that their results are consistent with the Keynesian/Hick theory of ‘‘normal backwardation.’’

In contrast, several studies have reported that risk premiums in commodity futures are non-existent. Dusak (1973) examined the returns and risks of investments in three commodities (corn, soybeans, and wheat) from 1952 through 1967. She reports average returns that are close to zero, while the variability of returns is close to that of common stocks over the same period. Similar results were reported by Bessembinder (1992). Looking at 16 non-financial commodities from 1967 through 1989, he finds only 1 of the 16 commodities recorded a significant non-zero return. Kolb (1996) reports similar findings. He examined returns for 33 commodities from 1969 through 1992. Twenty-one of the commodities had returns that did not differ significantly from zero. Nine recorded returns that were significantly positive, while three had returns that were significantly negative. These findings do not accord with the Keynesian/Hicks model but are more in line with Hardy's gambling theory.

Risks and Returns in Housing Futures

Jud and Winkler (2008) examine the returns and risks of investments in housing futures. They employ data on daily housing futures prices obtained from the CME from May 2006 through May 2007, covering the trading of 11 separate contracts. On every day that a housing futures contract opened (the housing futures market is very thin and contracts do not always trade every day), a long contract was assumed to be purchased and held to maturity. This resulted in following the returns on 1,018 individual futures contracts. The purchase price was assumed to be the average of the open and settle price for the day. The contracts were assumed to be fully collateralized by an equivalent investment in T-bills, so that the total return to the investment included the accumulated interest on the T-bills. This approach followed the work of Bodie and Rosansky (1980).

Jud and Winkler (2008) report that the average return on all 1,018 contracts for the 11 areas was 8.6%, with a standard deviation of 12.6%. The highest average returns were recorded in New York (NYM), Chicago (CHI), and Miami (MIA). The lowest returns were registered in Los Angeles (LAX) and Denver (DEN). The highest risk area when ranked on the basis of the coefficient of variation was LAX. San Francisco (SFR) and Chicago (CHI) had the lowest risk.

Jud and Winkler (2008) also find a large difference between the performance of the S&P/Case-Shiller Home Price Indices (spot prices) and the returns on the collateralized housing futures contracts. The average annualized monthly percentage change in the associated S&P/Case-Shiller Home Price Indices across all 11 areas during the period May 2006 through March 2007, was -3.4%, while investment in fully collateralized housing futures returned an annualized average of 8.6%. These results conform to Keynes' (1930) theory of ''normal backwardation,'' because speculators appear to earn substantial risk premiums even in a falling market (shown in Exhibit 9, Panel C).

The work of Leventis (2008) is supportive of Jud and Winkler's (2008) results. He shows that housing futures prices are not unbiased estimates of future housing prices because they tend to be set below the expected future spot price. Leventis tracked the movements of futures prices from December 2006 to September 2007 for Los Angeles, New York, and the 10-city national CSI. He reported that futures prices tend to rise as the contracts near maturity and to converge to the CSI at maturity. Prior to maturity, the futures price tends to be consistently less than the ultimate value of the CSI at maturity. Leventis' findings are similar to those reported by Reiss (2008), who provides further evidence that futures prices are downwardly biased estimates of home prices.

The research reported here suggests that expected movements in housing prices are not a basis for returns to investors in futures. Futures investors earn above normal profits only when the spot price at maturity turns out to be higher than expected when they purchased the futures contract. A futures contract accordingly is a bet on the direction and magnitude of the future spot price, with holders of long futures contracts benefiting when spot prices exceed market expectations. Unless an investor has special knowledge of the future direction of spot prices, his expected returns in the long run should approach the risk-free rate plus an appropriate risk premium.

Additional Evidence

This section provides additional empirical evidence on the returns and risks of housing futures. Here we extend our earlier analysis (Jud and Winkler, 2008) using new data on daily housing futures prices from May 2006 through May 2008. The data track the trading of 11 separate contracts. On every day that a housing futures contract opens, a long contract is assumed to be purchased and held to maturity. This results in tracking the returns on 1,952 individual futures contracts. The purchase price is assumed to be the average of the open and settle price for the day.

Exhibit 10 shows the average annualized price returns on contracts traded from May 2006 that matured on or before May 2008.11 Note that the returns do not include any interest that may have been earned on securities pledged as collateral for the futures contracts. Accordingly, the returns represent the average returns only from price appreciation.

The average return on all 1,952 contracts for the 11 areas was 2.28%, with a standard deviation of 13.01%. The highest average returns were registered in New York (5.17%), Boston (4.80%), and Chicago (3.74%). The lowest returns were recorded in San Francisco (_0.08%), Las Vegas (1.12%), and the 10-City Composite (1.52%).

Exhibit 10 Returns and Risks on Housing Futures Contracts

Area	*N*	Ave. Return	Std. Dev.	*t*-value	Coeff. of Var.
Boston (BOS)	117	4.80%	7.74%	6.67*	1.61
Chicago (CHI)	86	3.74%	10.55%	3.27*	2.82
Denver (DEV)	81	2.11%	7.63%	2.47*	3.62
Los Angles (LAX)	291	2.07%	19.59%	1.80*	9.48
Las Vegas (LAV)	117	1.12%	11.29%	1.07	10.08
Miami (MIA)	348	2.03%	12.69%	2.98*	6.24
New York (NYM)	200	5.17%	6.49%	11.24*	1.26
San Diego (SDG)	171	1.61%	18.75%	1.12	11.63
San Francisco (SFR)	193	-0.08%	9.13%	-0.11	120.82

Washington, DC (WDC)	128	2.61%	15.21%	1.93*	5.84
10-City Composite (CUS)	221	1.52%	6.72%	3.36*	4.41
All Areas	1,952	2.28%	13.01%	7.75*	5.70

Note: *Statistically significant at the 0.05 level using a one-tail test.

T-tests of the significance of the return averages reveal that all but 3 of the 11 area mean returns are statistically significant from zero at the 0.05 level using a one-tail test. The average of all 11 areas, which includes 1,952 contracts, also is statistically significant at the 0.05 level and above. The results support our earlier work suggesting that speculators earn significant risk premiums.

The highest risk areas when ranked on the basis of the coefficient of variation are San Francisco, San Diego, and Las Vegas. The lowest risk areas are New York, Boston, and Chicago. Interestingly, the New York metro area has both the highest average returns and the lowest risk.

Futures versus Housing Market Returns

One of the motivations of investment in housing futures is often thought to be the ability to capture the returns associated with housing investment without the costs of direct investment in housing. Our data allow us to examine the suitability of futures investment as a substitute for direct investment in housing. To do this, we calculated the returns earned by direct purchase of the CSI and compared it to the average return earned from investment in futures. Alongside each of our 1,952 futures contracts, the CSI for the corresponding city was assumed to be purchased in the same month as the futures contract and held until the futures contract matured. At maturity, the value of the CSI equaled the maturity value of the futures contract.

The correlation coefficient between the two return series is 0.50. As shown in Exhibit 11, the average return on the 1,952 futures contracts was 2.28%, with a standard deviation of 13.01%. In comparison, direct investment in the CSI produced an average annual return of -2.74%, with a standard deviation of 4.10%, suggesting that direct investment in housing has lower returns and risks relative to investments in housing futures (Exhibit 11). This result accords with Gorton and Rouwenhorst (2004), who compared the returns earned from commodity futures with direct purchase of the commodities. They found that the historical returns from investments in commodity futures have far exceeded the returns earned by direct investments in the commodities themselves.

Exhibit 11 Comparative Returns from CSI and Housing Futures Contracts (Annualized percentage returns)

Statistic	CSI	Futures
Mean	-2.74	2.28
Median	-1.52	2.40
Max.	4.21	186.20
Min.	-19.99	-79.10
Std. Dev.	4.10	13.01

Skewness	-1.84	5.06
Kurtosis	6.65	64.75
Jarque-Bera	2,183.39	318,437.30
Probability	0.00	0.00

Exhibit 11 reports the Jarque-Bera test statistics for normality of the return distributions. The low reported probability suggests rejection of the null hypothesis of a normal distribution for both CSI and housing futures returns. The CSI returns are skewed to the left and more peaked than a normal distribution, while the futures returns also are more peaked but skewed to the right.

Forecasting Housing Prices with Futures

Another oft-cited virtue of futures prices is their utility in forecasting future spot prices. For example, media reporters and housing economists have begun to employ housing futures prices as indicators of the future path of housing prices.[12] In this section, we present evidence of the value of futures prices as unbiased predictors of future housing values.

For each of the 1,952 futures contracts that we tracked, we compute a predicted percentage change in housing prices by comparing the futures price at which the contract is purchased (Ft) with the CSI at the time of purchase (HP_t). The predicted percentage price change is:

$$\text{Predicted \% Change in Housing Prices} = ((F_t - HP_t)/HP_t) * 100.$$

We compare this to the actual percentage change in housing prices over the term of the contract (n), which we compute as follows:

$$\text{Actual \% Change in Housing Prices} = ((HP_{t+n} - HP_t)/HP_t) * 100.$$

Exhibit 12 plots the relationship between the predicted and actual housing price changes. The estimated regression equation between the predicted and actual percentage changes is (t-values shown in parenthesis):[13]

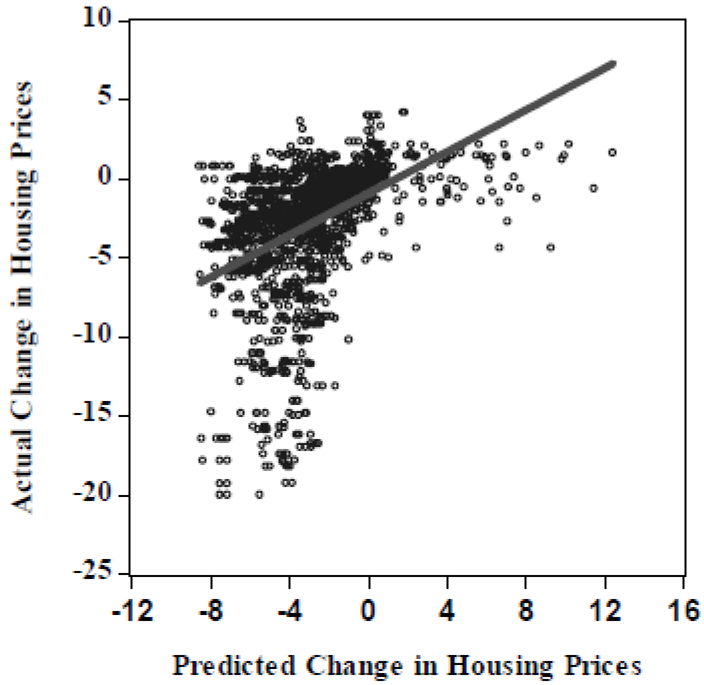
Actual % Change = -0.896 + 0.662 * Predicted % Change.

(7.38) (21.00)

$R^2 = 0.18$, $n = 1,952$

The relationship is statistically significant at the 0.01% probability level, although there remains substantial unexplained variation between the predicted and actual changes, as evidenced by the low value of R2. The estimated beta coefficient of 0.662 is significantly less than one, indicating that futures prices are not unbiased estimates of actual future housing prices. In our sample, when actual housing prices trended down, futures prices tended to overestimate the actual decline in prices. This is illustrated in Exhibit 9 (Panel C) above.

Exhibit 12 Predicted and Actual Changes in Housing Prices



These results conform to the expectations of the Keynesian/Hicks model. Because speculators earn a positive rate of return, futures price will not normally settle at the weighted average expected spot price. Accordingly, futures prices will always be downwardly biased estimates of expected future spot prices. A possible explanation for this phenomenon is that there are more people who are willing to sell housing futures than to buy them. Sellers may be individual contractors, large home builders, or companies whose product sales are closely correlated with housing prices. Buyers of these contracts are primarily speculators, because it is unlikely that anyone is expecting deliveries of housing in the future that need to be hedged with long contracts. Speculators must, therefore, be compensated for taking on this risk.

Conclusion

The CME housing futures market provides a market where hedgers and speculators can transfer housing risk. The market also offers a number of avenues for further housing-related research.

The research and empirical data examined here indicate that speculators earn significant risk premiums for assuming the risk of future fluctuations in housing prices.

But the returns and risks earned by investors in housing futures appear to be substantially different than the risks and returns earned by those who invest in housing directly. Indeed, investors who are long in housing futures appear to earn significant positive returns even when housing prices are falling.

The risk premiums earned by future market speculators appear to vary widely among the 11 areas examined. Why this occurs and the factors responsible for the variation merit examination.

Because the risks and returns of housing and housing futures are not the same, the contribution of housing futures to a portfolio of stocks, bonds, and other assets needs to be examined. While a large body of work has looked at the contribution of housing to a household's overall portfolio, additional work to examine housing futures would be useful.

Although housing futures prices are positively correlated with future housing prices, housing futures prices are not unbiased estimators of future housing prices. As Keynes and Hicks suggest, futures prices will not normally settle at the weighted average expected spot price because speculators must earn positive returns. Therefore, futures prices provide downwardly biased estimates of future housing prices. Our estimates indicate that futures prices tend to overestimate the decline in actual housing prices when prices are falling. Given the importance of accurate forecasts of housing prices, more research is needed in this area.

With the importance of housing to household wealth and the overall economy, it is unclear why the CME housing futures market has attracted so little interest and trading volumes have remained so small. It seems that this market offers a way for individuals, businesses, and others to transfer housing risk, but the low trading volumes in the market indicate that few are willing to utilize this mechanism. Exactly, why this is so is another avenue of further research.

Endnotes

1. The Chicago Mercantile Exchange merged with the Chicago Board of Trade in 2007, henceforth called the CME Group.

2. Information on S&P/GRA Commercial Real Estate Indices Futures can be found at http://www.cme.com/ trading/prd/ re/uscre.html.

3. http://www.macromarkets.com/ recent news/ press releases /2008/20080611 PRUSHPMS.pdf.

4. Chicago Mercantile Exchange, *CME Rulebook*, Chapter 419, CME Metro Area Housing Index Futures (Chicago, CME, 2006).

5. The performance bond required can be found at the CME website: http: / /www.cme.com/trading/prd/ re/housing.html.

6. Chicago Mercantile Exchange, *CME Rulebook*, Chapter 8, http://www.cmegroup.com/tools-information/CMErulebook.html.

7. CME Group, 2007 Annual Report (Chicago, IL).

8. The authors are indebted to John W. Labuszewski of the CME Group for this point. For example, in March 2008, the ratio of open interest to trading volume for the popular CME E-mini S&P futures contract was 0.72, in contrast to a ratio of 18.0 for CME housing futures.

9. Personal correspondence with the authors, 12/08/2008.

10. Keynes (1930), p. 143.

11. Contracts maturing in May 2008 were settled on the basis of the average price index in the January 2008–March 2008 period.

12. Various news reports of futures-based predictions of housing prices and congressional testimony by Robert Shiller's are cited in Leventis (2008).

13. The equation is estimated using the White (1980) adjustment for heteroscedasticity of unknown form.

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