



**Recent Trends in Home Prices:  
Differences across Mortgage and Borrower Characteristics**

August 2008

## **Preface**

This Office of Federal Housing Enterprise Oversight (OFHEO) research paper analyzes differences in recent price trends for homes with different types of financing and borrower characteristics. The work follows preliminary research published in January that uncovered relative price weakness for homes not purchased with Enterprise-financed mortgages. This paper is part of OFHEO's ongoing effort to enhance public understanding of the nation's housing finance system. The paper was prepared by Andrew Leventis of the Office of Policy Analysis and Research. Patrick J. Lawler, Robert S. Seiler Jr., Jesse Weiher, and Bob Collender provided helpful comments.

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## *Introduction*

Research has suggested that recent home price declines, all else equal, have been less severe for homes with conforming, conventional mortgages than for homes purchased with alternative types of financing. In trying to identify the reasons why the OFHEO and S&P/Case-Shiller house price indexes have diverged in recent periods, Leventis (2008) found significant price weakness for relatively inexpensive homes that were not financed by Fannie Mae and Freddie Mac (“Enterprise”) loans.<sup>1</sup> The relative weakness was evident even after attempts were made to control for systematic differences in the location of Enterprise-financed homes within cities. The results were intriguing because, all else equal, it is not obvious why home financing or borrower characteristics should be correlated with appreciation patterns.

This brief analysis extends the prior work, revealing recent price patterns for homes with different financing and borrower characteristics. The investigation, which makes use of a unique dataset containing house price and mortgage data assembled from a number of sources, reviews price patterns in California over the last several years. Price trends are reviewed for homes with mortgages having different loan-to-value (LTV) ratios, borrower FICO scores, and debt-to-income ratios. The results are also stratified based on whether the underlying mortgage was a fixed- or adjustable-rate loan.

The results are relatively consistent across the classification variables used and broadly indicate that homes with higher-risk mortgages generally have experienced greater price declines in recent periods. The concluding section to this report discusses a number of possible explanations.

## *Data and Methodology*

Since the Leventis report’s finding that Enterprise and non-Enterprise-financed homes had significantly different price patterns, OFHEO has assembled a dataset that enables a more detailed investigation. As before, historical sales price data are obtained from Enterprise data submissions as well as from an external data vendor, DataQuick Information Systems. The latter dataset contains sales of homes that were not financed with Enterprise loans. Home sales financed with jumbo mortgages will be reflected in the latter but not in the Enterprise data. Also, the latter dataset will contain a much greater proportion of homes financed with subprime and Alt-A mortgages.

Mortgage and buyer credit characteristics are then added to the historical transactions data so that, for each sale, the dataset contains information on the type of loan used (e.g., fixed- or adjustable-rate mortgage), the borrower’s credit score, the loan-to-value ratio, the payment- and debt-to-income ratios, and other loan characteristics. Two sources of loan-level information are used. Mortgage-level data for homes purchased with Enterprise loans are available from datasets

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<sup>1</sup> See Leventis, Andrew, “Revisiting the Differences between the OFHEO HPI and the S&P/Case-Shiller Indexes: New Explanations,” OFHEO Research Paper, January 2008, available at: [www.ofheo.gov/media/research/OFHEOSPCS12008.pdf](http://www.ofheo.gov/media/research/OFHEOSPCS12008.pdf).

submitted to OFHEO each quarter as part of OFHEO’s supervisory activities.<sup>2</sup> Loan information from First American CoreLogic’s “LoanPerformance” dataset is also used, which provides explicit indication of loan and borrower characteristics for some of the home purchases reflected in the DataQuick data.<sup>3</sup>

The augmented transactions dataset is then used to construct various financing-specific house price indexes. The repeat-sales indexing methodology, which is used by OFHEO in its construction of the House Price Index (HPI), is used. In this approach, homes with two or more sales are identified and the estimation model is fed transaction “pairs” that report appreciation for a given home over a specific interval.<sup>4</sup>

For the purposes of classifying the data and producing the separate price indexes, the price trajectory followed by each home is assumed to be a function of the financing characteristics at the time of the first of the home valuations. Hence, a price index for “Low FICO Score” homes is estimated using valuation pairs that had low FICO scores at the time of the first of the sales in the transaction pair.<sup>5</sup>

Unfortunately, data constraints generally prohibit the analysis from segmenting homes into many groups; too few observations are available, for example, to reliably estimate an index for homes with conforming, adjustable-rate mortgages that have loan-to-value and credit scores within specific given ranges. Estimating separate price trends for such finely-targeted groups would be possible if one were to aggregate data from fairly large geographic areas. If financing characteristics systematically differ across geographic areas, however, that aggregation runs the risk of producing illusory correlations between financing characteristics and price trends. The association between financing characteristics and price patterns may simply reflect differences in price trends within the subject area.

In this analysis, houses are aggregated into two groups: those in central California and those in the rest of the state.<sup>6</sup> The two areas have experienced different rates of price decline of late, with

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<sup>2</sup> These datasets are not publicly available.

<sup>3</sup> Unfortunately, although the historical house price dataset from DataQuick reports the specific address for a given property sale, the loan information in LoanPerformance reports no address detail. The primary identifying information in the LoanPerformance loan data are sales price, the sales date, and the property zip code. Matching a given LoanPerformance loan to the appropriate sale data reported in the DataQuick data thus requires a “fuzzy” matching procedure. The merging approach employed in this analysis was very conservative and only associated loan-level information from LoanPerformance to a given DataQuick transaction if the matching variables (zip code, sales month, and sales price) were identical between the two datasets and multiple observations were not present in either dataset for those linking variables.

<sup>4</sup> For details concerning how OFHEO implements the repeat sales methodology, see Calhoun, Charles A. “OFHEO House Price Indexes: Technical Description” March 1996, available at [www.ofheo.gov/Media/Archive/house/hpi\\_tech.pdf](http://www.ofheo.gov/Media/Archive/house/hpi_tech.pdf)

<sup>5</sup> In a more-involved analysis, transaction pairs might be classified differently. Alternative classification schemes would be justified, for example, if the source of the financing-price trend relationship stemmed from a systematic relationship between borrower (or loan) characteristics and bidding behavior. If borrowers whose loans were subprime, for example, tended to overbid for homes, then the observed appreciation for a given home would be correlated with financing characteristics for *both* sales in the valuation pair. In that case, price patterns would be estimated for combinations of financing characteristics.

<sup>6</sup> For the purposes of this paper, “central California” includes the following metropolitan Statistical Areas (MSAs): Bakersfield, Hanford-Corcoran, Visalia, Fresno-Madera, Merced, Modesto, Stockton, Sacramento-Arden-Arcade-Roseville, and Chico. These areas have generally experienced the sharpest price declines in the state.

central California experiencing much greater price weakness. The aggregation ensures sufficient sample sizes for the analysis and, because a high degree of correlation exists in price trends within the two areas, there is little risk that the estimated price-financing relationship will reflect heterogeneity in price trends within each area.

## *Results*

Figures 1a and 1b report the association between borrower FICO scores at the time of origination and price trends. It is clear in both graphs that notable differences exist when price trends are stratified into low, medium, and high-FICO groups.<sup>7</sup> In central California, for example, home prices for low-FICO homes declined 23.7 percent between the first quarters of 2007 and 2008. By contrast, prices fell 19.7 percent for high-FICO properties. In other areas of California, the difference in the depreciation rate was slightly greater; the value of high-FICO properties fell approximately 15.8 percent, while prices of low-FICO homes fell an estimated 22.4 percent.

When measured as declines from peak prices, the recent performance differences are even larger. Although low- and high-FICO homes appreciated at similar rates during the housing boom, values for low-FICO homes in central California are much farther below their peak levels. Figure 1a indicates that, in the first quarter, values for homes with low-FICO borrowers were 32.6 percent below their peak, as compared to 25.1 percent off-peak for high-FICO borrowers. For other parts of California, the difference in the decline since peak is nine percentage points, with a decline of 28.0 percent for low-FICO homes and 19.0 percent of high-FICO homes.

Figures 2a and 2b review price trends by LTV ratio at origination. Whereas the relationship between FICO scores and recent price trends showed steadily declining performance with poorer credit scores, the LTV-depreciation relationship is not as clear. Homes with low-LTV loans experienced the least severe price declines since prices peaked, but price declines for homes with medium-LTV mortgages were slightly more severe than those for high-LTV homes. In central California, for example, homes with medium-LTV mortgages experienced a 30.3 percent price decline since peak compared to a 27.6 percent decline for high-LTV homes (and only 25.4 percent for low-LTV homes). For other parts of California, the since-peak declines are relatively similar for medium and high-LTV homes (25.5 and 24.0 percent respectively), whereas homes backing low-LTV mortgages have exhibited only a 16.3 percent price decline.

Notable in Figures 2a and 2b is the relatively extreme price run-up for homes with the highest LTV ratios during the housing boom. The graphs reveal that, during the height of the boom, appreciation rates for such homes were consistently several percentage points higher than those for other homes. The difference was particularly large for areas outside of central California.

Figures 3a and 3b focus on LTV ratios and FICO scores, but aim at a finer level of resolution than the analyses done in Figures 1 and 2. The graphs isolate relative price trends for homes with the mortgages of the highest creditworthiness and lowest risk; a separate price index is calculated for homes with mortgages that: were fixed-rate, had borrowers with FICO scores of 660 or greater, and

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<sup>7</sup> FICO scores less than 660 are placed in the “low” group, those between 660 and 720 are described as “medium,” and “high” FICOs are defined as those in excess of 720.

involved LTV ratios of 80 percent or less. This index is compared with an alternative index constructed using homes with all other mortgage and borrower types.

The figures reveal the same clear relationship between mortgage quality and recent price trends as was evident in Figures 1a and 1b. Whether measured over the most recent four-quarters or since prices peaked, values have not dropped as dramatically for the homes with the lower-risk mortgages. For central California, Figure 3a indicates that prices have fallen about 16.2 percent over the latest four quarters for homes with the safer mortgages and about 23.5 percent for other homes. Since peak, prices have declined 20.8 percent for homes with low-risk mortgages and 30.9 percent for others. Figure 4b reveals the same basic phenomenon in other parts of the state, with four-quarter and since-peak declines significantly smaller for homes with the safest mortgages.

Figures 4a and 4b stratify price trends based on the “back-end” debt-to-income (DTI) ratios of underlying mortgages. The “back-end” DTI ratio is the quotient of the borrowers’ total debt servicing payments (including mortgage) to their gross income. Three DTI groups—which are based on the ratio at the time of loan origination—are established: 0-25 percent, 25-40 percent, and 40 percent and above. The graphs reveal that the latter group (i.e., homes with the most financially stressed homeowners) is evidencing distinctly greater price declines than the other groups. Although these properties exhibited price increases that were similar to those of other homes during the housing boom, the recent price declines have been sharper. Prices have fallen from their peak levels by about 30.7 percent for high-DTI homes in central California. This contrasts with declines of about 27.8 and 22.9 for medium- and low-DTI homes in the same area. In the rest of California, medium and high-DTI homes have (respectively) fallen 5.3 and 9.6 percentage points more than their low-DTI counterparts.

With homes with “middle-tier” DTI ratios evidencing price declines between the declines shown by high- and low-DTI homes, these results show the same near-monotonic relationship as was evident in figures 1a and 1b. Unfortunately, because mortgage risk factors are correlated (higher DTI ratios are associated with lower credit scores), the similarity is in part a reflection of that correlation. If more data were available, it might be possible to distinguish the separate relationships by, for example, analyzing price trends for homes whose mortgages had high DTI ratios and high credit scores.

### *Discussion*

A number of potential explanations can be proffered for the heterogeneity in price trends across borrower and financing characteristics. The simplest explanation is that the differences merely represent unaccounted-for systematic variation based on where the houses are located. If price trends differ *within* each broad geographic area (e.g., central California), then the relatively poor performance of the Low-FICO and High-DTI loans could be a product of those homes being disproportionately located in poor-performing areas.

Unfortunately data constraints make it very difficult to test this hypothesis. Testing the hypothesis would require the construction of multiple indexes for each of a number of relatively small geographic areas (e.g., metropolitan areas). Even with the very large dataset assembled here, the statistical error associated with estimates for these indexes would generally be too large to enable reliable testing.

Another potential cause of the relatively poor performance would involve changes in home quality. If the various borrower and loan characteristics are systematically related to the homeowner's ability or willingness to maintain the home, then poor outcomes for homes with lower quality mortgages may indicate that those homes disproportionately fell into disrepair relative to others. Similarly, renovation and improvement activity may be diminished for such homes. The repeat-sales methodology cannot perfectly control for changes in home quality over time and thus any systematic differences in the evolution in home quality for different types of homes will be embedded in price change estimates.

One related issue involves the strong possibility that homes with higher-risk mortgages have disproportionately sold in distressed circumstances of late.<sup>8</sup> In this case, the relatively steep price declines for such homes may reflect greater deterioration in home conditions as well as the strong pricing pressures faced by professionals involved in liquidating lender-owned properties. As has been discussed in a great deal of economic literature, holding costs are large for lender-owned properties and prices tend to be discounted a great deal when such properties are sold. OFHEO is currently researching the impact of distressed sales on recent home price measures.

One final explanation for the poor performance of homes with higher-risk mortgages is that, whether because of fraud or buyer misperceptions about home values, prior values for such properties were above prevailing levels for similar homes.<sup>9</sup> Under this explanation, observed values for such homes had an upward bias during the boom period and the measured price decline in recent periods includes both the true decline in value as well as bias in the initial measurement.

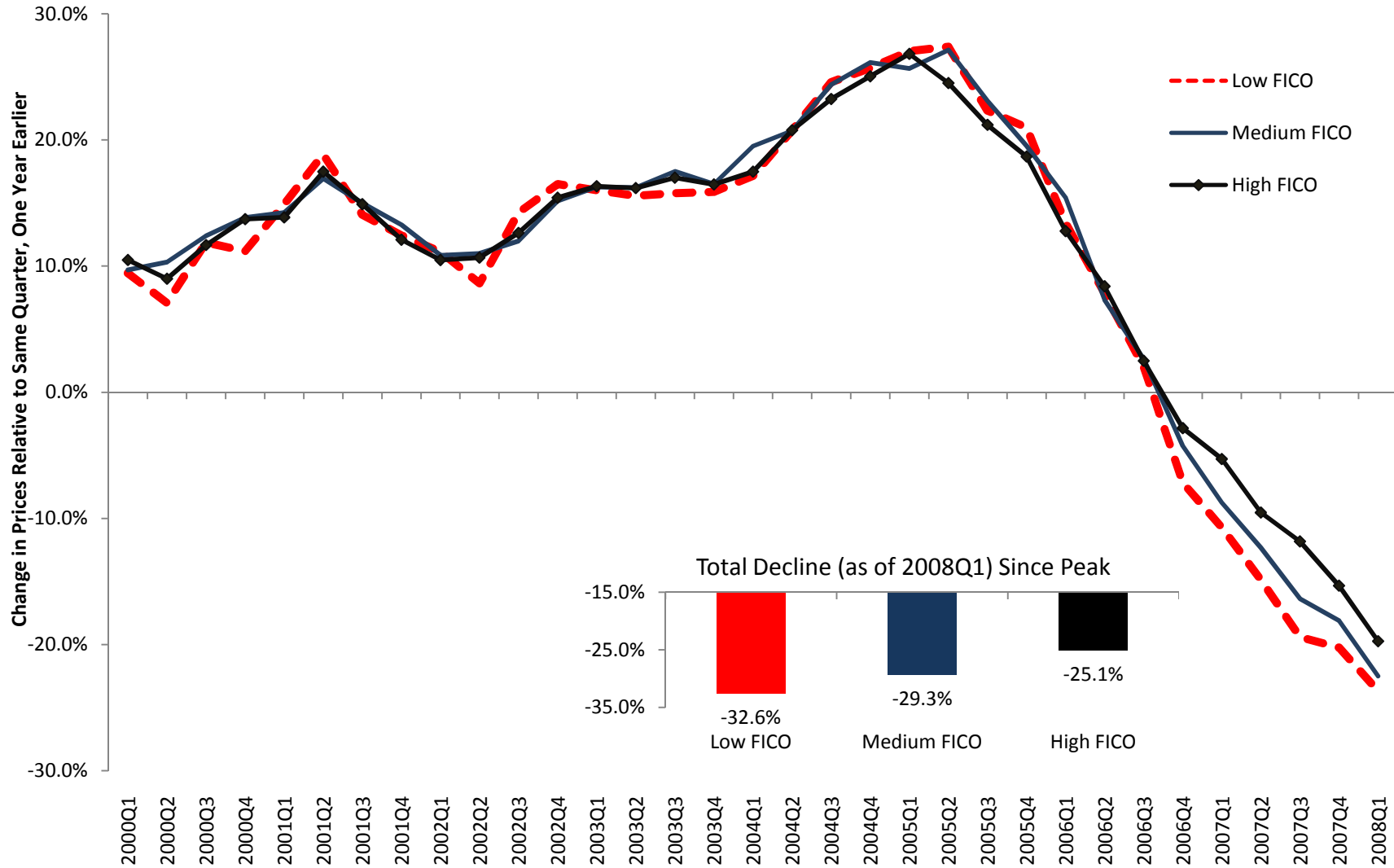
Although the underlying source of the performance gap between homes with higher and lower-risk mortgages is not clear, initial evidence indicates that, whatever the source, the added information in the separate indexes may be valuable in the modeling of loan defaults and prepayments. The explanatory power of loan default and prepayment models, which typically rely heavily on house price measures, seems to improve when they are fed price trend data that are specific to the underlying loan characteristics. Although the results are still preliminary, given the large differences in observed price patterns across financing characteristics, they would seem to justify further investigation.

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<sup>8</sup> For a recent discussion of the deteriorating performance of subprime mortgages, see Demyanyk, Yuliya and Otto Van Hemert, "Understanding the Subprime Mortgage Crisis," Federal Reserve Bank of St. Louis Supervisory Policy Analysis Working Paper (Working Paper 2007-05), available at: [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1020396](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1020396).

<sup>9</sup> A recent paper from the IMF broadly discusses "overshooting," although the discussions focuses on aggregate data and does not address differences across property types. See Klyuev, Vladimir, "What Goes Up Must Come Down? House Price Dynamics in the United States," IMF Working Paper, July 2008 (available at [www.imf.org/external/pubs/ft/wp/2008/wp08187.pdf](http://www.imf.org/external/pubs/ft/wp/2008/wp08187.pdf)).

**Figure 1a: Four-Quarter Price Changes by FICO Score**  
Central California



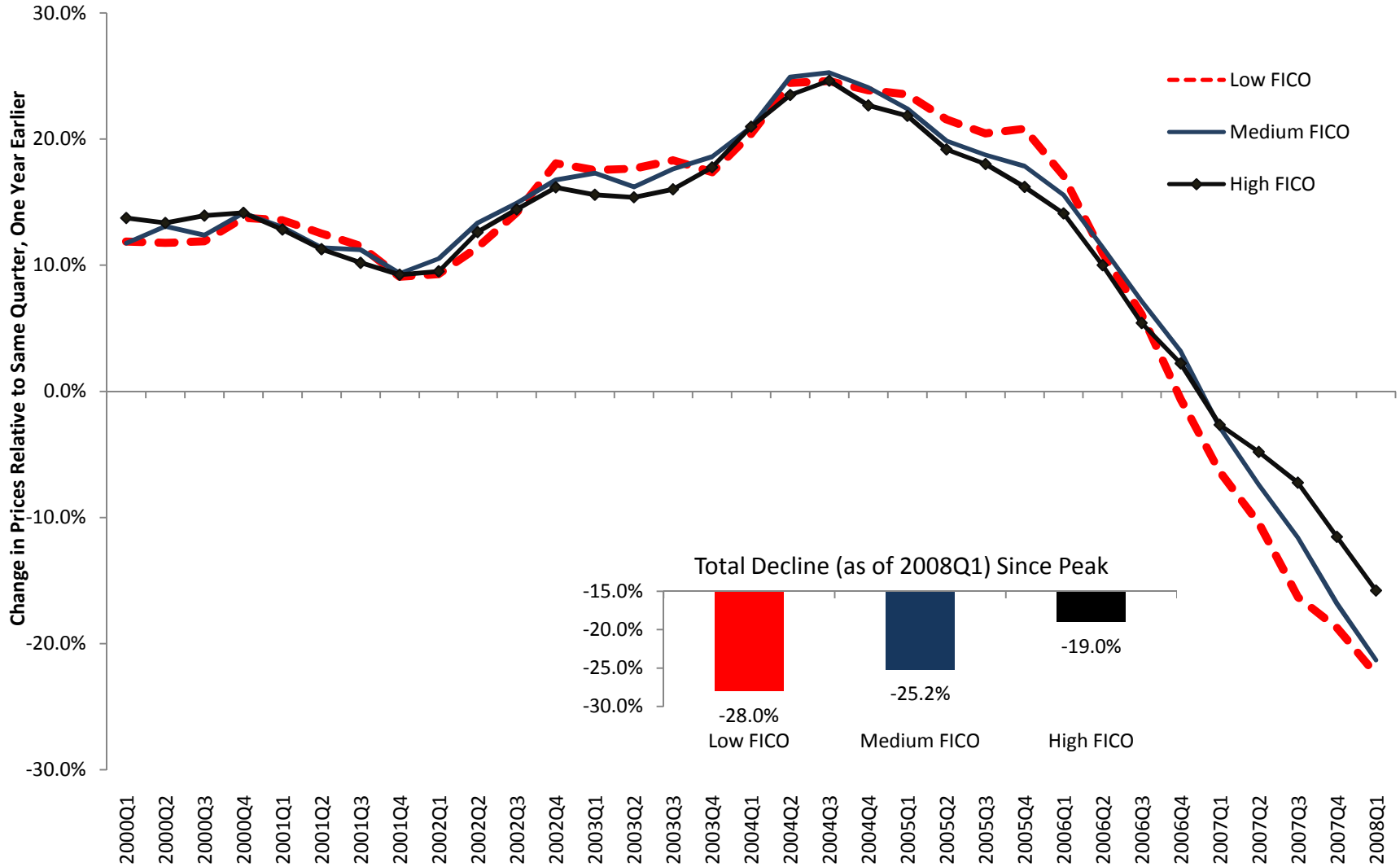
Notes:

1. "Low" FICO = FICO less than 660, "Medium" FICO = FICO between 660 and 720, "High" FICO = FICO equal to or greater than 720
2. "Central California" defined as the following MSAs: Bakersfield, Hanford-Corcoran, Visalia, Fresno-Madera, Merced, Modesto, Stockton, Sacramento-Arden-Arcade-Roseville, and Chico.

Sources: DataQuick Information Systems, First American CoreLogic LoanPerformance Data, Nonpublic Enterprise HPI and mortgage data submissions.



**Figure 1b: Four-Quarter Price Changes by FICO Score**  
 Other Areas (Primarily Coastal Areas)

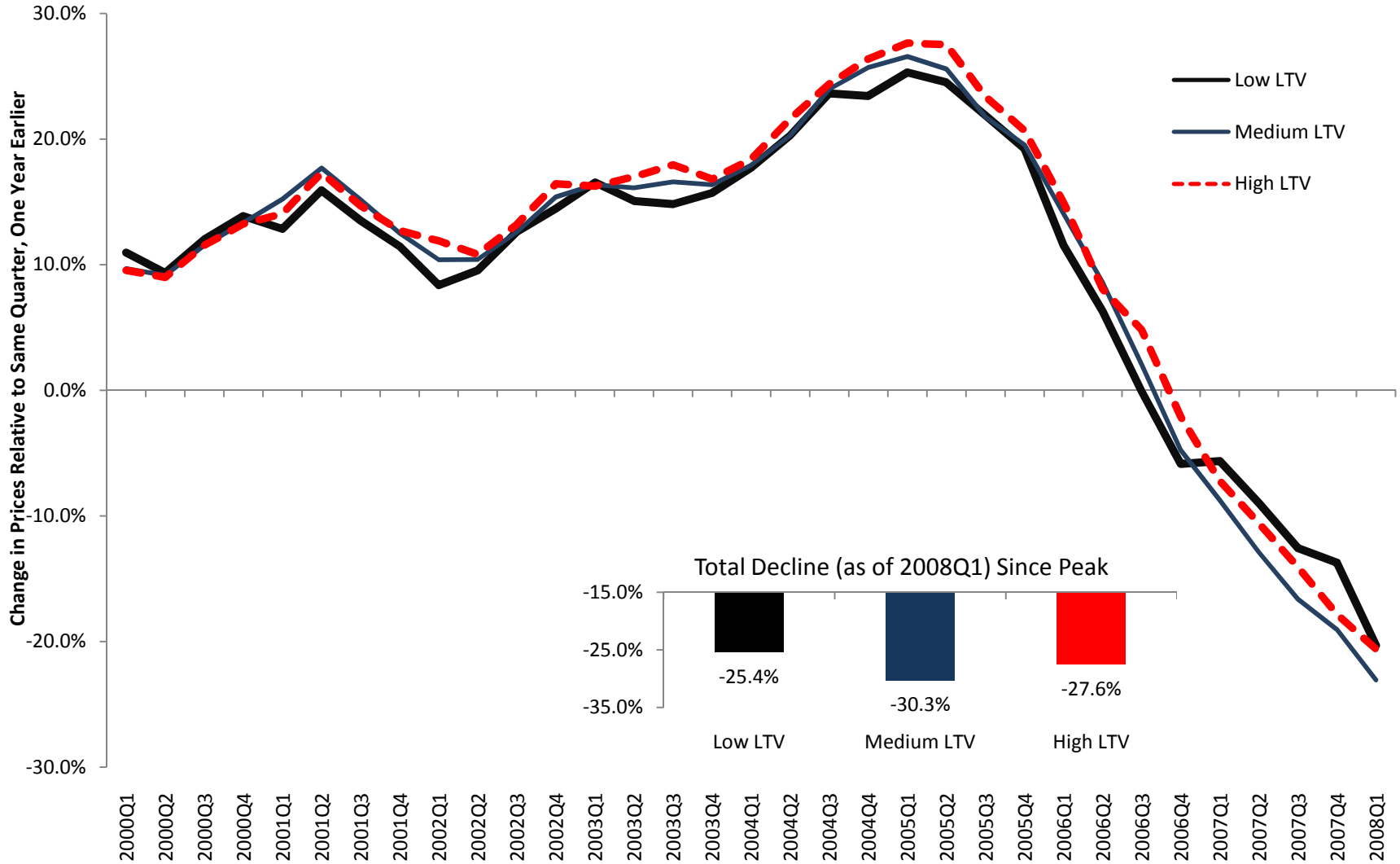


Notes:

1. "Low" FICO = FICO less than 660, "Medium" FICO = FICO between 660 and 720, "High" FICO = FICO equal to or greater than 720
2. "Central California" defined as the following MSAs: Bakersfield, Hanford-Corcoran, Visalia, Fresno-Madera, Merced, Modesto, Stockton, Sacramento-Arden-Arcade-Roseville, and Chico.

Sources: DataQuick Information Systems, First American CoreLogic LoanPerformance Data, Nonpublic Enterprise HPI and mortgage data submissions.

**Figure 2a: Four-Quarter Price Changes by Loan-to-Value (LTV) at Origination**  
Central California

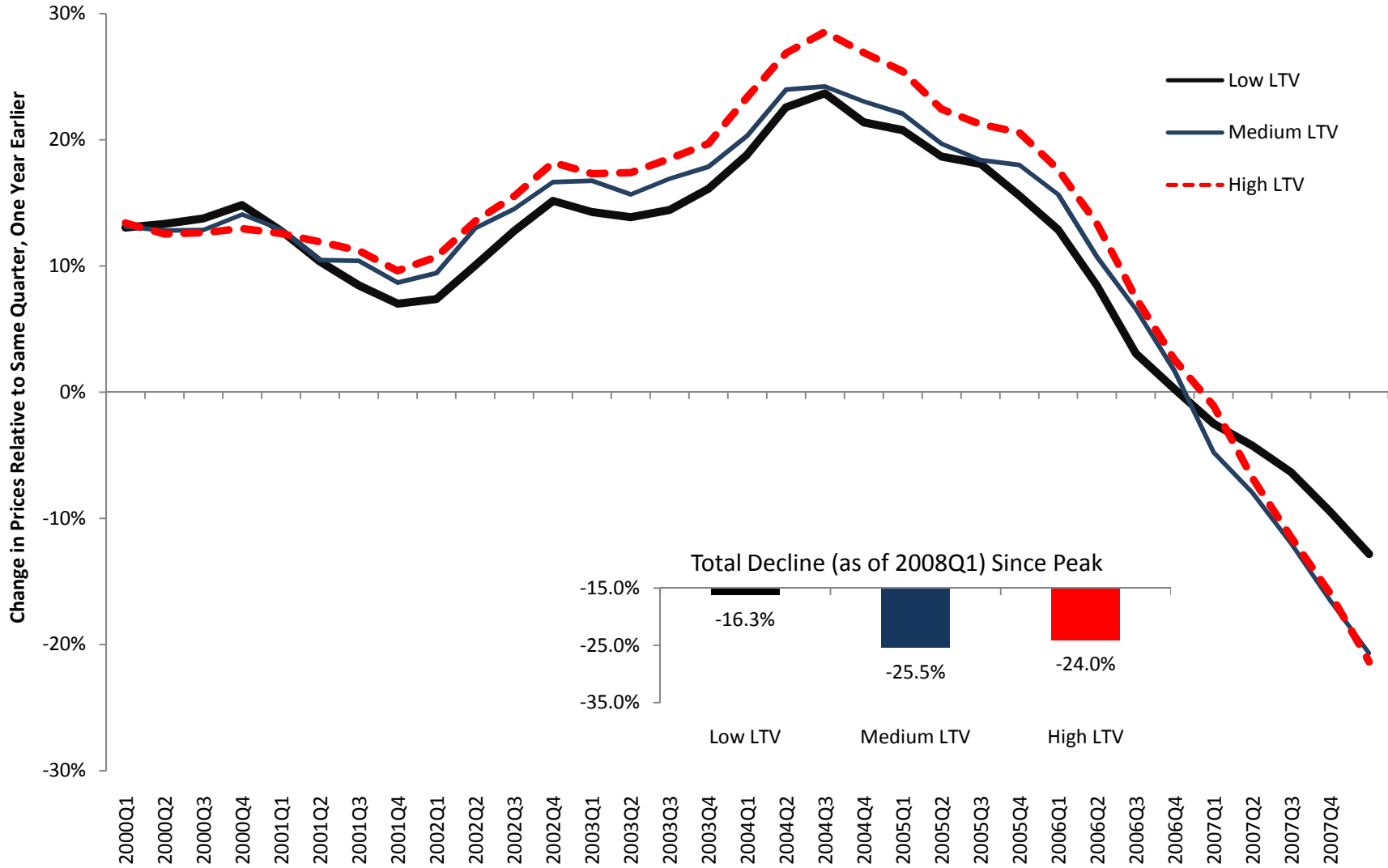


Notes:

1. "Low" LTV = LTV less than 75, "Medium" LTV = LTV between 75 and 90, "High" LTV = LTV greater than 90
2. "Central California" defined as the following MSAs: Bakersfield, Hanford-Corcoran, Visalia, Fresno-Madera, Merced, Modesto, Stockton, Sacramento-Arden-Arcade-Roseville, and Chico.

Sources: DataQuick Information Systems, First American CoreLogic LoanPerformance Data, Nonpublic Enterprise HPI and mortgage data submissions.

**Figure 2b: Four-Quarter Price Changes by Loan-to-Value (LTV) at Origination**  
Other California (Primarily Coastal)

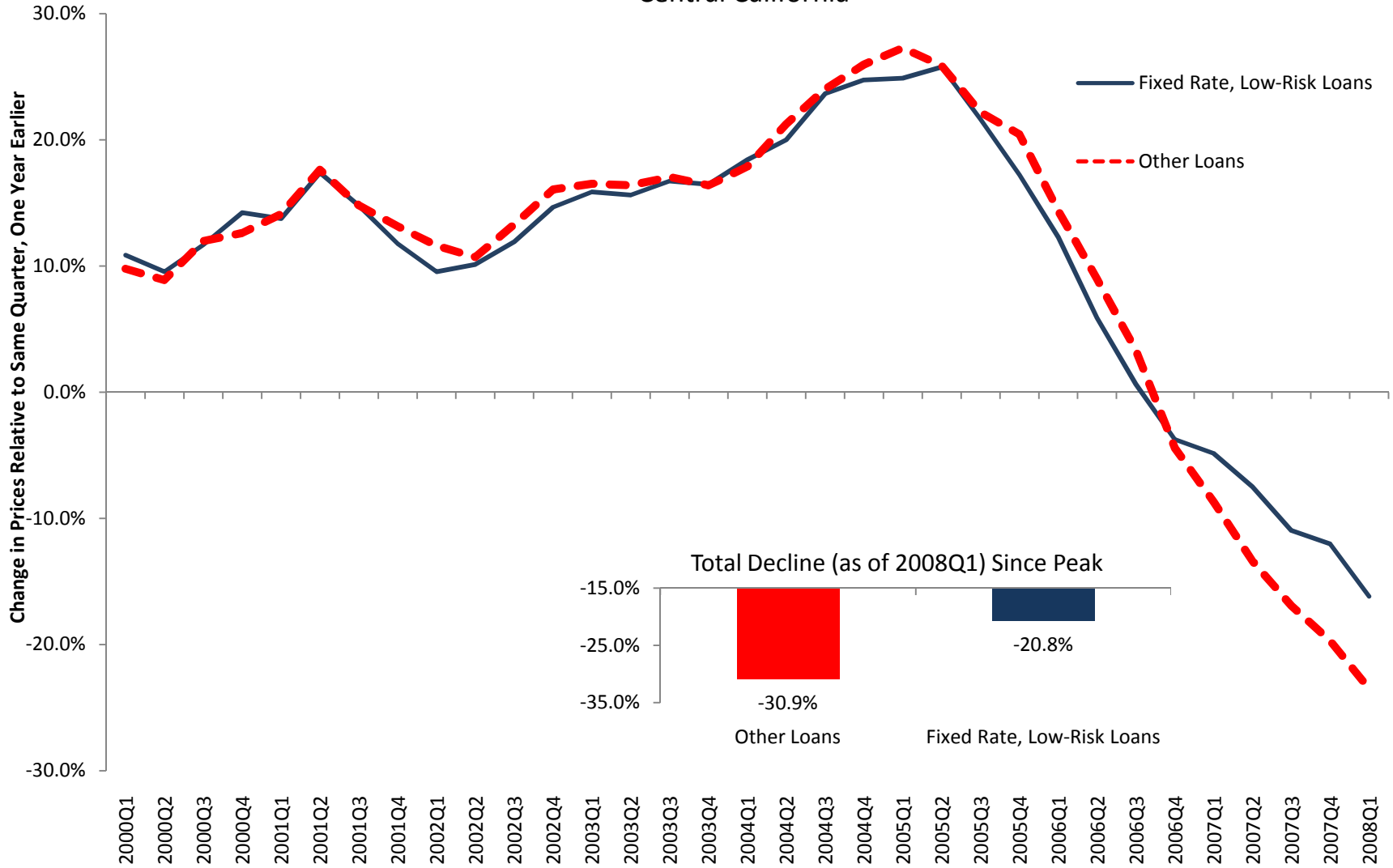


Notes:

1. "Low" LTV = LTV less than 75, "Medium" LTV = LTV between 75 and 90, "High" LTV = LTV greater than 90
2. "Central California" defined as the following MSAs: Bakersfield, Hanford-Corcoran, Visalia, Fresno-Madera, Merced, Modesto, Stockton, Sacramento-Arden-Arcade-Roseville, and Chico.

Sources: DataQuick Information Systems, First American CoreLogic LoanPerformance Data, Nonpublic Enterprise HPI and mortgage data submissions.

**Figure 3a: Four-Quarter Price Changes by Loan Type**  
Central California

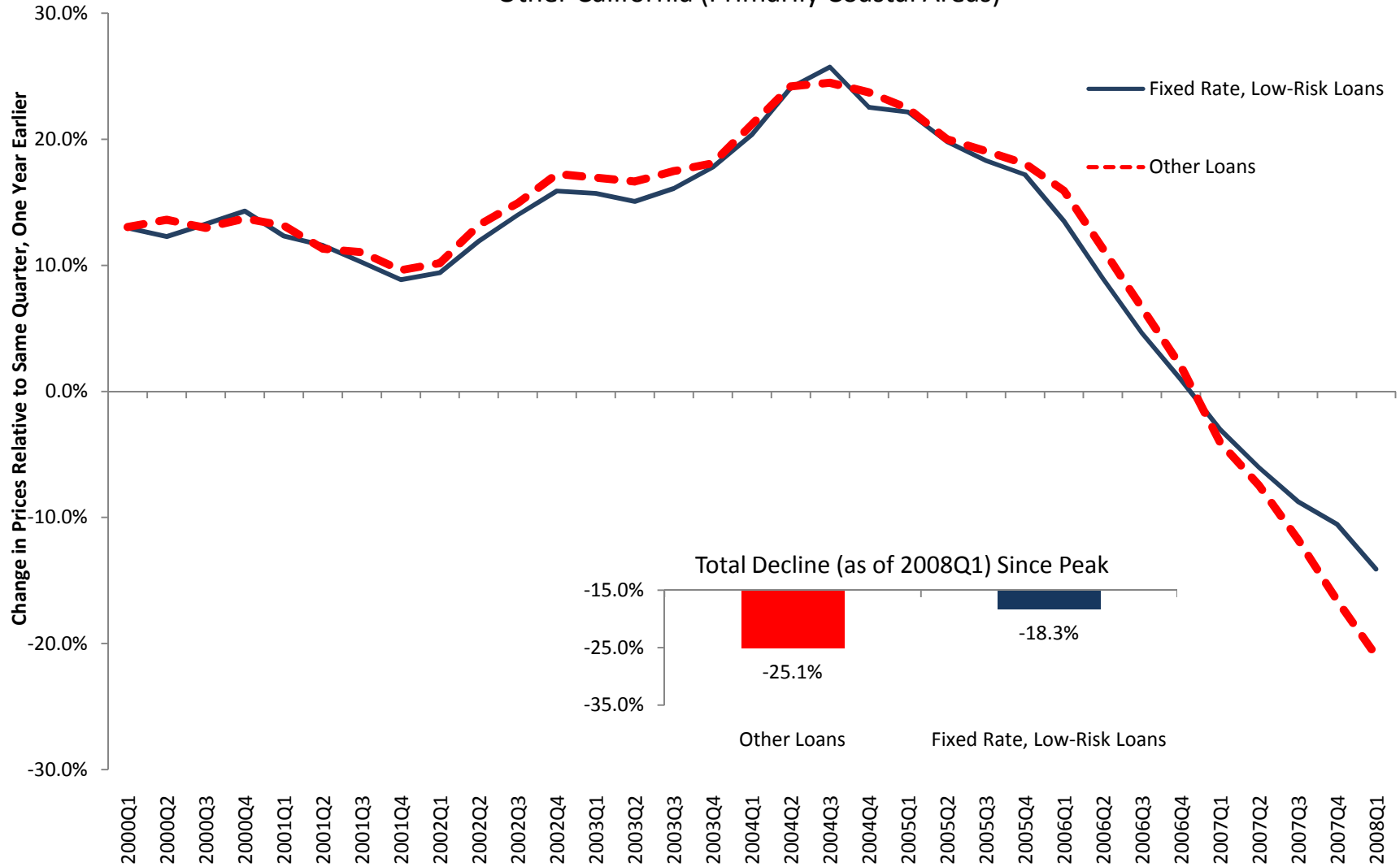


Notes:

- 1) "Fixed Rate, Low-Risk Loans" are defined as those with: Fixed Mortgage Rate, LTV<=80, Fico Score>=660
- 2) "Central California" defined as the following MSAs: Bakersfield, Hanford-Corcoran, Visalia, Fresno-Madera, Merced, Modesto, Stockton, Sacramento-Arden-Arcade-Roseville, and Chico.

Sources: DataQuick Information Systems, First American CoreLogic LoanPerformance Data, Nonpublic Enterprise HPI and mortgage data submissions.

**Figure 3b: Four-Quarter Price Changes by Loan Type**  
 Other California (Primarily Coastal Areas)

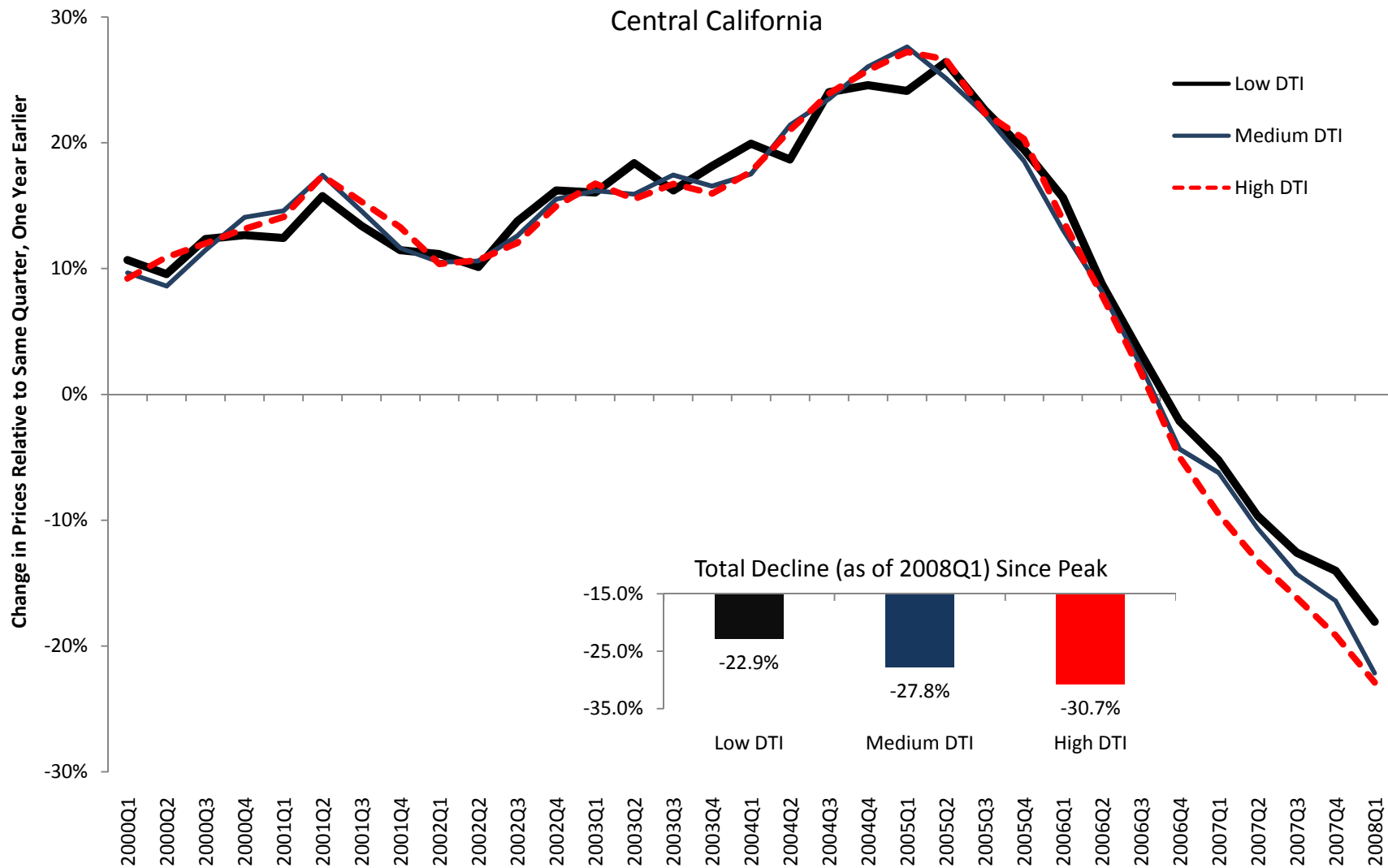


Notes:

- 1) "Fixed Rate, Low-Risk Loans" are defined as those with: Fixed Mortgage Rate, LTV<=80, Fico Score>=660
- 2) "Central California" defined as the following MSAs: Bakersfield, Hanford-Corcoran, Visalia, Fresno-Madera, Merced, Modesto, Stockton, Sacramento-Arden-Arcade-Roseville, and Chico.

Sources: DataQuick Information Systems, First American CoreLogic LoanPerformance Data, Nonpublic Enterprise HPI and mortgage data submissions.

**Figure 4a: Four-Quarter Price Changes by Debt-to-Income (DTI) Ratio at Origination**  
Central California



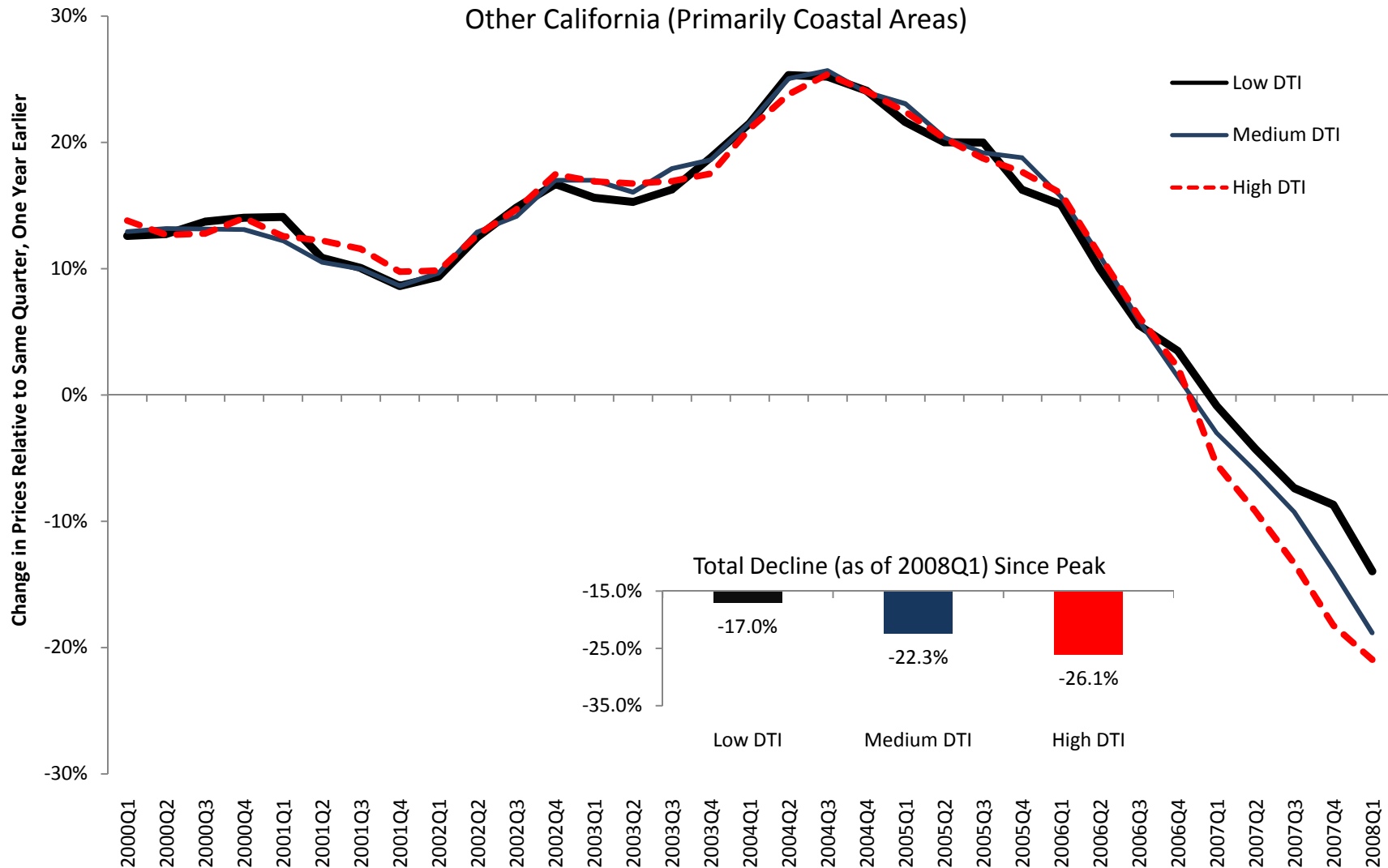
Notes:

1. "Low" DTI = DTI less than .25, "Medium" DTI = DTI between .25 and .40, "High" DTI = DTI greater than .40
2. "Central California" defined as the following MSAs: Bakersfield, Hanford-Corcoran, Visalia, Fresno-Madera, Merced, Modesto, Stockton, Sacramento-Arden-Arcade-Roseville, and Chico.

Sources: DataQuick Information Systems, First American CoreLogic LoanPerformance Data, Nonpublic Enterprise HPI and mortgage data submissions.

**Figure 4b: Four-Quarter Price Changes by Debt-to-Income (DTI) Ratio at Origination**

Other California (Primarily Coastal Areas)



Notes:

1. "Low" DTI = DTI less than .25, "Medium" DTI = DTI between .25 and .40, "High" DTI = DTI greater than .40
2. "Central California" defined as the following MSAs: Bakersfield, Hanford-Corcoran, Visalia, Fresno-Madera, Merced, Modesto, Stockton, Sacramento-Arden-Arcade-Roseville, and Chico.

Sources: DataQuick Information Systems, First American CoreLogic LoanPerformance Data, Nonpublic Enterprise HPI and mortgage data submissions.