U.S. Housing Market Conditions

SUMMARY

The housing market had a poor second quarter in 2008, continuing 2 years of decline. The number of single-family building permits, starts, and completions declined in the second quarter, as did new and existing home sales. Excessive inventories of both new and existing homes remain, enough to last 10 to 11 months. The multifamily sector is somewhat mixed: permits and starts increased, but completions decreased. The subprime meltdown continues, with foreclosure rates on subprime adjustable-rate mortgages posting a 20-percent increase over the previous quarter. Conditions in the rental housing market showed little change from the first quarter of 2008, with a tiny decrease in the vacancy rate and no change in absorptions. The overall economy posted a Gross Domestic Product (GDP) growth rate of 1.9 percent in the second quarter of 2008. The housing component of GDP decreased by 15.6 percent, leading to a reduction of GDP growth by 0.62 percentage point.

Housing Production

Most housing production indicators declined in the second quarter of 2008 but reflected a slight improvement over the universal declines recorded during the past several quarters. The number of building permits issued increased, although starts and completions continued to decline. Manufactured housing has posted nearly continuous declines since the hurricane-induced orders of late 2005. Shipments of manufactured homes are now below 90,000 units at a seasonally adjusted annual rate (SAAR), the lowest since the third quarter of 1961.

■ During the second quarter of 2008, builders took out permits for new housing at 1,033,000 units (SAAR), up 4 percent from the first quarter but down 30 percent from the second quarter of 2007. Single-family permits were issued for 633,000 (SAAR) housing units, a decrease of 2 percent from the first quarter and a decrease of 40 percent from the second quarter of 2007. This decrease is the 11th consecutive quarterly decline for single-family permits.

■ Builders started construction on 1,016,000 (SAAR) new housing units in the second quarter of 2008, down 4 percent from the first quarter and down 30 percent from the second quarter of 2007. Single-family housing starts totaled 670,000 (SAAR) housing units, down 8 percent from the first quarter and down 42 percent from the second quarter of 2007. This drop is the ninth consecutive quarterly decline for single-family starts.

■ Builders completed 1,118,000 (SAAR) new housing units in the second quarter of 2008, down 11 percent from the first quarter and down 27 percent from the second quarter of 2007. This decrease is the ninth consecutive quarterly decline. Single-family completions totaled 851,000 (SAAR) in the second quarter of 2008, down 9 percent from the first quarter and down 33 percent from the second quarter of 2007, reflecting the ninth consecutive quarterly decline for this indicator.

■ Manufactured housing shipments continued at very low levels. In the second quarter of 2008, manufacturers shipped 88,000 (SAAR) housing units, down 4 percent from the first quarter and down 11 percent from the second quarter of 2007.

Housing Marketing

Housing sales and builders' attitudes continued downward in the second quarter of 2008, but sales prices showed signs of strength. Although new home sales have declined in the past 11 quarters, and existing home sales have fallen for five consecutive quarters, the median price of new homes was unchanged and

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the price of existing homes rose in the second quarter. Average prices for both new and existing homes rose. At the end of the second quarter, inventories of homes available for sale were sufficient to last for the next 10 to 11 months at the current sales rates. The nearly continuous drop in new home sales is the likely source of pessimism among builders as measured by the National Association of Home Builders/Wells Fargo Housing Market Index, which fell again in the second quarter.

- In the second quarter of 2008, 535,000 (SAAR) new single-family homes were sold, down 5 percent from the 561,000 (SAAR) homes sold in the first quarter and down 37 percent from the second quarter of 2007.

- REALTORS® sold 4,913,000 (SAAR) existing single-family homes in the second quarter of 2008, down 1 percent from the first quarter and down 16 percent from the second quarter of 2007.

- The median price of new homes sold in the second quarter of 2008 was $234,100, unchanged from the first quarter but down 3 percent from the second quarter of 2007. The average price for new homes sold in the second quarter was $304,700, up 5 percent from the first quarter but down 2 percent from the second quarter of 2007. A constant-quality house would have sold for $303,500 in the second quarter, up 3 percent from the first quarter but down 3 percent from the second quarter of 2007.

- The NATIONAL ASSOCIATION OF REALTORS® reported that the median price for existing homes was $208,100 in the second quarter of 2008, up 5 percent from the first quarter but down 7 percent from the second quarter of 2007. The average price for existing homes in the second quarter was $252,400, up 3 percent from the first quarter but down 7 percent from the second quarter of 2007.

- At the end of the second quarter of 2008, 426,000 new homes were in the unsold inventory, down 9 percent from the end of the first quarter and down 22 percent from the end of the second quarter of 2007. This inventory will support 10.0 months of sales at the current sales pace, down 1.2 months from the end of the first quarter but up 1.7 months from the end of the second quarter of 2007. The inventory of existing homes available for sale at the end of the second quarter consisted of 4,490,000 homes, up 9 percent from the end of the first quarter and up 3 percent from the end of the second quarter of 2007. This inventory would last for 11.1 months at the current sales rate, up 1.1 months from the end of the first quarter and up 2.0 months from the end of the second quarter of 2007.

- Home builders were slightly more pessimistic in the second quarter of 2008. The National Association of Home Builders/Wells Fargo composite Housing Market Index was 19 in the second quarter of 2008, down 1 index point from the first quarter and down 11 index points from the second quarter of 2007. The index is based on three components—current sales expectations, future sales expectations, and prospective buyer traffic. Of these components, future sales expectations and prospective buyer traffic rose, but these increases were not enough to offset the decrease in current sales expectations.

Affordability and Interest Rates

Housing affordability declined in the second quarter of 2008, according to the index published by the NATIONAL ASSOCIATION OF REALTORS®. The composite index indicates that the family earning the median income had 125.2 percent of the income needed to purchase the median-priced, existing single-family home using standard lending guidelines. This value is down 7.2 points from the first quarter but up 16.0 points from the second quarter of 2007. The decrease in affordability from the first quarter is attributed to the 5-percent increase in the median price of an existing single-family home and the 11-basis-point increase in the mortgage interest rate and was partially offset by an 2.2-percent increase in median family income. The second quarter home-ownership rate was 68.1, up 0.3 percentage point from the first quarter rate but 0.1 percentage point below the rate of the second quarter of 2007.

Multifamily Housing

The multifamily (five or more units) housing sector performed better than the single-family sector in the second quarter of 2008. Production indicators were mixed; building permits and starts increased, but completions decreased. The absorption of new rental units was unchanged, but the rental vacancy rate fell.

- In the second quarter of 2008, builders took out permits for 364,000 new multifamily units, up 21 percent from the first quarter but down 1 percent from the second quarter of 2007.

- Construction was started on 329,000 new multifamily units in the second quarter of 2008, up 9 percent from the first quarter and up 24 percent from the second quarter of 2007.

- Builders completed 243,000 units in the second quarter of 2008, down 17 percent from the first quarter but up 10 percent from the second quarter of 2007.

- The rental vacancy rate in the second quarter of 2008 was 10.0 percent, down 0.1 percentage point from the first quarter but up 0.5 percentage point from the second quarter of 2007.
- Market absorption of new rental apartments was unchanged, with 59 percent of new apartments completed in the first quarter of 2008 leased in the first 3 months following completion. This absorption rate is unchanged from the previous quarter but up 8 points from the rate recorded in the first quarter of 2007.

USING HMDA AND INCOME LEVERAGE TO EXAMINE CURRENT MORTGAGE MARKET TURMOIL

Much attention is currently being devoted to understanding the nature and dimensions of the current mortgage market turmoil. Most analyses rely on proprietary data rich in detail about specific loan terms but with little demographic information on borrowers and mortgage holders. In this article, we use Home Mortgage Disclosure Act (HMDA) data and introduce a measure of leverage and payment risk to examine the dimensions of the current turmoil.[1]

Data about mortgage applications and applicants together with subsequent outcomes have been collected since 1990 and made available by the Federal Reserve Board of Governors in cooperation with the Federal Financial Institutions Examination Council. The data have been used for myriad applications, including tracking trends in the mortgage market and screening for compliance with legislation and regulations intended to promote fair lending and equal opportunity for securing credit. Although much has been accomplished with HMDA data, a perennial lament has been the lack of basic underwriting variables that would permit analytic controls for collateral, credit, and payment risk. Standard underwriting data, such as the loan-to-value (LTV) ratio, property price, or appraisal, along with the borrower's credit score and payment-to-income or debt-to-income ratios, are not collected. The addition of these data would allow for much more direct comparison of like borrowers and loan terms, thereby enabling analysts to better monitor trends in the character and quality of mortgage lending and more directly identify situations of noncompliance with fair housing and equal credit opportunity regulations.

Nevertheless, HMDA data do provide for the construction of a little-used but potentially powerful variable that would enable analysts to more closely control for the income leverage employed by the borrower and for the associated payment risk when securing the reported loan amount. This measure, when coupled with other data reported under HMDA, could contribute greatly to our understanding of the evolution, nature, and magnitude of the current-day upheaval in our mortgage and real estate markets. This article begins that effort with a preliminary examination, followed by some basic findings.

With the inclusion of both the loan amount (M) and the borrower's gross income (Y) on which the lender relied for qualifying the borrower, the mortgage-to-income (M/Y) ratio can be formed. The M/Y ratio is a direct measure of the income leverage employed by the borrower to obtain the mortgage loan. The higher the ratio is, the more dollars of loan provided by the lender per dollar of qualifying income. Moreover, a borrower has only three ways to increase the leverage of his or her income with virtually all mortgage products; that is, a borrower can qualify for a higher loan amount with a given income by (1) increasing the front-end payment-to-income ratio that governs the size of the payment and associated mortgage allowed, (2) lowering the interest rate used to calculate the initial qualifying payment and associated mortgage amount, or (3) reducing the rate at which principal is repaid by extending the term or paying interest only, assuming property tax rates and homeowner insurance premiums are fixed.

These findings follow directly from relating the standard self-amortizing mortgage formula for the monthly principal, interest, tax, and insurance (PITI) payment to the standard front-end ratio (FER) underwriting limitation to that payment. Thus,

$$(FER \star Y)/12 = PITI = M \star [A_n + (1/LTV) \star (T + I)/12] \quad (1)$$

Where FER = front-end ratio,

  Y = gross annual income,

  PITI = monthly payment for principal, interest, tax, and insurance,

  M = mortgage loan amount,

  A_n = amortization formula

  = $i / [1 - 1/(1+i)^n]$, $i = 1/12^{th}$ the annual interest rate

  and n = number of periodic payments,

LTV = loan-to-home value ratio, M/V,

T = annual property tax as percentage of home value,

I = annual home insurance premium as percentage of home value.

One may set LTV = 1 for simplicity and rearrange terms to yield the following relationship showing that the M/Y ratio is equal to the FER divided by 12 times the sum of the amortization factor and monthly percentage contribution to tax and insurance:

$$M/Y = FER/ [12^{\star}(A_n + (T+I)/12] \qquad (2)$$

The M/Y ratio for an interest-only mortgage is obtained by substituting the monthly interest rate, i, for A_n in equation 2.

As noted previously, one may directly observe in equation 2 that the M/Y ratio rises with a relaxation of the FER or a reduction in the amortization factor A_n resulting from a reduction in the interest rate or increase in the repayment period n. Exhibit 1 presents the M/Y ratios for alternative qualifying interest rates and FERs and confirms that the M/Y ratio rises with increases in the FER at any given interest rate or with reductions in the qualifying interest rate at any given FER. The M/Y ratio is higher at every interest rate and FER combination for interest-only mortgages and dramatically

so in the very-low- interest rate range of 3-, 2-, and 1-percent interest.

With the aid of a couple key assumptions, one may use the M/Y ratio together with the annual percentage rate (APR) spread reported in the HMDA data to classify loans generally according to the likely source of financing and type of mortgage product used with its associated payment risk. Returning to equation 2, if one assumes that taxes and insurance amount to a specific percentage (such as 1.5 percent) of home value and lenders typically will not allow borrowers to exceed a specific FER (such as 0.30), unless the FER is offset with unusual compensations such as a very high credit score,[2] then the M/Y ratio is uniquely determined by the qualifying interest rate. Thus, one may classify loans in the HMDA file according to their status with respect to high or low cost and high or low leverage. High cost normally distinguishes nonprime loans from prime loans and high leverage distinguishes loans with temporary below-market qualifying advantages that pose a risk of payment shock when rates adjust to the fully indexed market rates or payments rise to retire balances from initial negative amortization. Exhibit 2 shows that our demarcation between high- and low-cost loans is approximated at an APR of 7 percent[3] and that high-leverage loans are distinguished with a step function showing the maximum income qualifying

Exhibit 1. Mortgage-to-Income Ratio by Qualifying Interest Rate and Front-End Ratio (30-Year Self-Amortizing Mortgage)

Qualifying Interest Rate	Front-End Ratio				
	0.28	0.30	0.32	0.34	0.40
20.0%	1.30	1.39	1.48	1.58	1.86
19.0%	1.36	1.46	1.56	1.65	1.94
18.0%	1.43	1.53	1.63	1.74	2.04
17.0%	1.50	1.61	1.72	1.83	2.15
16.0%	1.59	1.70	1.81	1.93	2.27
15.0%	1.68	1.80	1.92	2.04	2.40
14.0%	1.78	1.91	2.04	2.16	2.54
13.0%	1.90	2.03	2.17	2.30	2.71
12.0%	2.02	2.17	2.31	2.46	2.89
11.0%	2.17	2.32	2.48	2.63	3.09
10.0%	2.33	2.49	2.66	2.83	3.32
9.0%	2.51	2.69	2.87	3.05	3.59
8.0%	2.72	2.91	3.11	3.30	3.88
7.0%	2.95	3.16	3.37	3.59	4.22
6.5%	3.08	3.30	3.52	3.74	4.40
6.0%	3.22	3.45	3.68	3.91	4.60
5.5%	3.37	3.61	3.85	4.09	4.81
5.0%	3.53	3.78	4.03	4.28	5.04
4.5%	3.69	3.96	4.22	4.49	5.28
4.0%	3.87	4.15	4.43	4.70	5.53
3.5%	4.06	4.36	4.65	4.94	5.81
3.0%	4.27	4.57	4.88	5.18	6.10
2.0%	4.72	5.05	5.39	5.73	6.74
1.0%	5.22	5.60	5.97	6.34	7.46

Exhibit 2. Mortgage-to-Income Ratio at Varying Qualifying Interest Rates for Fully Indexed APR Rate (30-Year Self-Amortizing Mortgage)

Quali-fying Interest Rate	Fully Indexed Rate (APR)																			
	20.0%	19.0%	18.0%	17.0%	16.0%	15.0%	14.0%	13.0%	12.0%	11.0%	10.0%	9.0%	8.0%	7.0%	6.0%	5.0%	4.0%	3.0%	2.0%	1.0%
20.0%	1.39																			
19.0%	1.46	1.46																		
18.0%	1.53	1.53	1.53																	
17.0%	1.61	1.61	1.61	1.61																
16.0%	1.70	1.70	1.70	1.70	1.70															
15.0%	1.80	1.80	1.80	1.80	1.80	1.80														
14.0%	1.91	1.91	1.91	1.91	1.91	1.91	1.91													
13.0%	2.03	2.03	2.03	2.03	2.03	2.03	2.03	2.03												
12.0%	2.17	2.17	2.17	2.17	2.17	2.17	2.17	2.17	2.17											
11.0%	2.32	2.32	2.32	2.32	2.32	2.32	2.32	2.32	2.32	2.32										
10.0%	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49									
9.0%	2.69	2.69	2.69	2.69	2.69	2.69	2.69	2.69	2.69	2.69	2.69	2.69								
8.0%	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91							
7.0%	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16	3.16						
6.0%	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45					
5.0%	3.78	3.78	3.78	3.78	3.78	3.78	3.78	3.78	3.78	3.78	3.78	3.78	3.78	3.78	3.78	3.78				
4.0%	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15			
3.0%	4.57	4.57	4.57	4.57	4.57	4.57	4.57	4.57	4.57	4.57	4.57	4.57	4.57	4.57	4.57	4.57	4.57	4.57		
2.0%	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	
1.0%	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60

APR = annual percentage rate.

leverage that may be achieved for each percentage point APR interval as one moves left from the lowest to highest interval at 20 to 21 percent. Thus, any loan with an APR falling between 6 and 7 percent would be considered a high-leverage loan were it to have an M/Y ratio greater than 3.45. Loans with an APR falling between 7 and 8 percent and having an M/Y ratio greater than 3.16 would be considered high-leverage loans, and so on. The threshold ratios are somewhat conservative in that they are consistent with ratios that could be achieved using an APR that is 2 percentage points below the highest rate in each 1-point APR interval using a more standard FER of 0.28 rather than 0.30. (See Exhibit 1 and compare the M/Y ratio of 1.53 at 18-percent APR and 0.30 FER with the ratios at 19 and 17 percent APRs with an FER of 0.28.)

Using the M/Y ratio step factors in Exhibit 2 and the positive APR spread indicator in the HMDA data, loans originated[4] in 2004, 2005, and 2006 were grouped according to their status as high- or low-cost loans and high- or low-leverage loans. The number and percentage of loans within each group are reported in the first two panels of Exhibit 3.

Perhaps the most striking observation in Exhibit 3 is the more than doubling of the high-cost lending volume from 2004 through 2006, from 14.5 to 29.4 percent of

total loans, and the nearly three-fold increase in high-leverage lending within the high-cost sector, from 3.7 to 9.7 percent, despite higher prevailing interest rates in 2006. Avery, Brevoort, and Canner (2006), however, advise caution in interpreting year-to-year changes in the incidence of HMDA-reported high-cost lending because flattening of the Treasury yield curve as occurred through 2004 can result in a differentially increasing proportion of APRs for adjustable-rate mortgage (ARM) loans priced off shorter term rates to rise above the high-cost reporting threshold rates in comparison to fixed-rate loans.[5] Despite the caution, Avery, Brevoort, and Canner (2006) cite corroborating statistics from *Inside Mortgage Finance*, indicating that, from 2004 to 2005, the share of higher cost, nonprime lending did increase on the order of 7.5 percentage points, primarily in the near-prime, Alt-A portion of the market.[6]

More importantly, however, Exhibit 3 shows an increase in the high-leverage lending share from 15.4 percent of all loans in 2004 to 21.6 percent in 2006, accounting for approximately 7.6 million loans over the 3-year period regardless of high- or low-cost status. Furthermore, the third panel of Exhibit 3 shows that, although refinancing declined somewhat over the period as a proportion of total lending, it remained disproportionately higher as a percentage of high-leverage lending in both the high- and low-cost sectors. Borrowers were

Exhibit 3. Loan Distribution by High-Cost and High-Leverage Status

Year	High Cost		Low Cost		Total
	High Leverage	**Low Leverage**	**High Leverage**	**Low Leverage**	
Number of Loans					
2004	505,109	1,491,222	1,613,215	10,163,018	13,772,564
2005	1,243,047	2,522,268	1,534,849	8,949,142	14,249,306
2006	1,218,190	2,468,539	1,497,403	7,373,938	12,558,070
Percent of Loans					
2004	3.7	10.8	11.7	73.8	100.0
2005	8.7	17.7	10.8	62.8	100.0
2006	9.7	19.7	11.9	58.7	100.0
Percent Refinancing					
2004	68	53	56	54	55
2005	60	41	58	49	50
2006	60	42	54	46	48

disproportionately much more likely to use high-leverage loans in both the high- and low-cost sectors to refinance rather than purchase their homes, which, on one level, seems counterintuitive, because borrowers are in general most strapped and in need of maximum leverage for their initial home purchase.

The disproportionate and increasing use of high-leverage loans by refinancers is even more apparent in Exhibit 4. High-leverage refinances increased from 16.6 percent of 2004 refinance loans to 25.9 percent of 2006 refinance loans. In comparison, high-leverage home purchase loans increased from 14 percent of 2004 purchase lending to 17.8 percent of 2006 purchase lending. Moreover, Exhibit 4 reveals a definite shift to the high-cost sector in both purchase and refinance lending that continued beyond 2005 well after mitigation of any reporting or yield curve measurement problems that may have been present in the 2004 data. High-cost loans accounted for 29.0 percent of all purchase loans in 2006 compared with 13.7 percent in 2004, and high-cost loans accounted for 29.8 percent of all 2006 refinance loans compared with 15.2 percent in 2004.

Exhibit 4 also presents demographic characteristics of the borrowers using the various lending sectors to purchase or refinance their homes. The third panel of Exhibit 4 shows that, although African-American borrowers accounted for approximately 7 to 9 percent of purchase and refinance lending over the 3-year period, they accounted for more than twice that percentage (between 14 and 19 percent) of the high-cost market for both purchase and refinance lending, with a slight preference for greater use of high leverage to purchase rather than refinance their homes.

Although Hispanic borrowers (shown in panel 4) were also more likely to use high-cost loans for home pur-

chases, they were significantly more likely to use high-leverage loans within both the high- and low-cost markets for home purchases. Moreover, Hispanic borrowers were significantly more likely to engage in high-leverage refinances in both the high- and low-cost markets.

Households in which the first listed name on the borrower's application was male (shown in panel 5) were less likely to use high-leverage lending, particularly high-cost leverage, to purchase or refinance their homes. In addition, although owner-occupant borrowers (shown in panel 6) accounted for roughly 85 percent of purchase loans and 91 percent of refinance loans over the 3-year period, they accounted for 95 to 97 percent of high-leverage purchase and refinance loans in both the high- and low-cost lending markets.

Panel 7 of Exhibit 4 shows that, although lower income borrowers who have incomes of less than 80 percent of area median income (AMI) accounted for roughly one-quarter of both purchase and refinance lending, they accounted for one-half or more of high- and low-cost high-leverage lending in 2004. Despite these trends, their share of overall lending declined by roughly 5 percent over the period from 2004 to 2006, and their share of high-cost loans declined precipitously, particularly in the high-cost, high-leverage sector for both purchase and refinance lending. The reduction in shares for lower income borrowers was more than fully replaced with the rising shares for higher income borrowers (who have incomes greater than 120 percent of AMI, shown in panel 9) in all lending sectors, particularly high-cost and high-leverage purchase and refinance lending. The $2,500 change in median income between 2004 and 2006 for high-cost, high-leverage refinancers compared with the $1,900 change for refinancers overall (shown in panel 10) no doubt reflects the observed shift from lower to higher income borrowers.

Exhibit 4. Characteristics of Purchase and Refinance Loans by High-Cost and High-Leverage Status

Panel	Year	Purchase Loans					Refinance Loans				
		High Cost		Low Cost		Total	High Cost		Low Cost		Total
		High Leverage	Low Leverage	High Leverage	Low Leverage		High Leverage	Low Leverage	High Leverage	Low Leverage	
		Number of Loans									
1	2004	162,085	694,757	715,319	4,709,799	6,281,960	343,024	796,465	897,896	5,453,219	7,490,604
	2005	497,905	1,490,961	641,247	4,605,148	7,235,261	745,142	1,031,307	893,602	4,343,994	7,014,045
	2006	485,218	1,419,871	682,566	3,988,388	6,576,043	732,972	1,048,668	814,837	3,385,550	5,982,027
		Percent of Loans									
2	2004	2.6	11.1	11.4	75.0	100.0	4.6	10.6	12.0	72.8	100.0
	2005	6.9	20.6	8.9	63.6	100.0	10.6	14.7	12.7	61.9	100.0
	2006	7.4	21.6	10.4	60.7	100.0	12.3	17.5	13.6	56.6	100.0
		African-American Borrower (%)									
3	2004	19	16	6	6	7	15	15	7	6	7
	2005	16	16	5	5	8	15	15	6	6	8
	2006	19	16	7	6	9	17	14	8	6	9
		Hispanic Borrower (%)									
4	2004	23	19	15	10	12	15	9	15	8	9
	2005	30	21	14	9	13	18	10	16	8	10
	2006	30	23	13	10	15	18	12	16	9	12
		Male Borrower (%)									
5	2004	57	63	63	69	67	54	62	60	69	66
	2005	58	63	63	68	66	55	62	61	68	65
	2006	57	62	62	68	65	54	61	59	66	63
		Owner-Occupant Borrower (%)									
6	2004	95	84	96	84	86	97	91	97	91	92
	2005	96	81	95	81	83	97	89	97	90	91
	2006	96	78	96	83	84	96	86	97	89	90
		Lower Income Borrower (Less Than 80 Percent of AMI) (%)									
7	2004	51	27	48	21	26	57	30	49	21	27
	2005	36	22	42	18	22	44	25	41	18	25
	2006	32	17	43	16	20	38	20	37	17	23
		Middle-Income Borrower (Between 80 and 120 Percent of AMI) (%)									
8	2004	27	31	27	26	27	27	33	29	27	28
	2005	27	28	27	24	25	31	31	30	26	28
	2006	27	25	27	23	24	30	28	29	25	27
		Higher Income Borrower (Greater Than 120 Percent of AMI) (%)									
9	2004	22	42	25	53	48	16	37	22	52	45
	2005	37	50	31	58	53	25	44	29	56	48
	2006	41	58	30	61	56	32	52	34	58	50
		Borrower Median Income ($)									
10	2004	61,477	59,996	64,300	60,451	60,866	61,883	58,320	65,088	61,799	61,827
	2005	62,815	60,987	64,497	61,002	61,433	63,006	59,869	65,401	62,367	62,454
	2006	63,589	62,183	65,160	62,454	62,760	64,349	61,642	66,258	63,659	63,744
		Underserved Area (%)									
11	2004	55	56	38	35	38	55	54	43	35	39
	2005	57	54	36	34	40	55	52	43	35	41
	2006	57	54	37	34	40	55	51	44	36	42

AMI = area median income.

Panel 11 of Exhibit 4 shows that, although overall about 40 percent of purchase and refinance loans from all lending sectors were made to borrowers living in underserved areas, approximately 55 percent of high-cost, high- and low-leverage lending was made to borrowers purchasing and refinancing their homes in underserved areas. This observation may not be particularly surprising given the aforementioned relative shares of high-cost lending for which minority and lower income borrowers accounted. The relative constancy of that share over the 3-year period despite the shift from lower income to higher income borrowers discussed previously, however, is somewhat surprising.

Exhibits 3 and 4 clearly show that a significant shift to higher leverage mortgage loans occurred between 2004 and 2006, particularly for borrowers purchasing or refinancing their homes with high-cost loans. What is not yet clear is which funding sources were underwriting the higher leverage loans and by how much leverage was increasing for individual borrowers. Exhibit 5 presents the decile distribution of M/Y leverage ratios by funding source for both purchase and refinance loans originated in 2001 through 2006 and the average annual interest rate prevailing in each year.

The first thing to note in Exhibit 5 is that, because the mix of low- and high-cost borrowers within the various (nongovernment-insured) lending sectors may change from year to year and not all borrowers will use maximum leverage to purchase or refinance their homes, year-to-year changes in the pattern of maximum leverage provided may be best observed in the upper portions of the distributions. Thus, one may compare the shaded ratios above the 60th percentile for 2001, when prime mortgage interest rates were in the neighborhood of 7 percent, with M/Y ratios in subsequent years to observe how maximum leverage for purchase and refinance lending changed with interest rates and underwriting of various funding sources. Focusing on purchase lending, one may observe that M/Y ratios increased by 30 to 40 basis points for loans funded by GNMA (or Ginnie Mae), 35 to 55 basis points for loans funded by government-sponsored enterprises (GSEs) Fannie Mae and Freddie Mac, 35 to 70 basis points for loans funded by portfolio lenders, and 35 to 60 basis points for loans funded by private mortgage pool issuers. Returning to Exhibit 1, one can observe that a 30-basis-point increase from an M/Y ratio calculated at 7-percent interest may be obtained by recalculating the ratio

Exhibit 5. Decile Distribution of Mortgage-to-Income Leverage Ratios for 2001 Through 2006

Funding Source	Year	Average Annual Interest Rate	10th Percentile	20th Percentile	30th Percentile	40th Percentile	50th Percentile	60th Percentile	70th Percentile	80th Percentile	90th Percentile
Purchase											
GNMA	2001	6.97%	1.46	1.74	1.96	2.16	2.35	2.56	2.78	3.05	3.46
	2002	6.54%	1.50	1.80	2.03	2.24	2.45	2.66	2.90	3.19	3.63
	2003	5.83%	1.56	1.88	2.13	2.36	2.58	2.81	3.07	3.38	3.86
	2004	5.84%	1.58	1.91	2.17	2.39	2.62	2.85	3.10	3.42	3.88
	2005	5.87%	1.58	1.92	2.18	2.40	2.63	2.86	3.12	3.43	3.88
	2006	6.41%	1.56	1.90	2.17	2.40	2.62	2.86	3.12	3.43	3.89
GSE	2001	6.97%	1.13	1.45	1.68	1.89	2.10	2.31	2.56	2.87	3.35
	2002	6.54%	1.20	1.53	1.77	2.00	2.21	2.45	2.71	3.04	3.56
	2003	5.83%	1.26	1.60	1.87	2.11	2.35	2.61	2.90	3.27	3.83
	2004	5.84%	1.26	1.62	1.89	2.14	2.38	2.65	2.94	3.33	3.90
	2005	5.87%	1.28	1.64	1.91	2.17	2.42	2.69	3.00	3.39	3.97
	2006	6.41%	1.27	1.63	1.90	2.15	2.40	2.67	2.96	3.34	3.90
Portfolio Lender	2001	6.97%	0.34	0.64	1.08	1.44	1.75	2.04	2.35	2.70	3.22
	2002	6.54%	0.37	0.68	1.17	1.57	1.90	2.21	2.53	2.92	3.48
	2003	5.83%	0.41	0.78	1.31	1.72	2.07	2.40	2.75	3.16	3.76
	2004	5.84%	0.46	0.80	1.40	1.85	2.23	2.58	2.96	3.40	4.03
	2005	5.87%	0.40	0.61	0.88	1.50	2.00	2.42	2.82	3.27	3.89
	2006	6.41%	0.37	0.55	0.79	1.39	1.92	2.35	2.76	3.23	3.92
Private Mortgage Pool Issuer	2001	6.97%	0.47	0.96	1.36	1.67	1.92	2.18	2.46	2.79	3.28
	2002	6.54%	0.45	0.91	1.43	1.77	2.06	2.34	2.64	3.00	3.52
	2003	5.83%	0.53	1.03	1.58	1.94	2.25	2.55	2.88	3.26	3.84
	2004	5.84%	0.53	0.83	1.48	1.92	2.27	2.60	2.95	3.35	3.93
	2005	5.87%	0.51	0.74	1.19	1.80	2.20	2.56	2.92	3.33	3.88
	2006	6.41%	0.46	0.66	0.92	1.62	2.06	2.41	2.76	3.14	3.65

Exhibit 5. Decile Distribution of Mortgage-to-Income Leverage Ratios for 2001 Through 2006 (continued)

Funding Source	Year	Average Annual Interest Rate	10th Percentile	20th Percentile	30th Percentile	40th Percentile	50th Percentile	60th Percentile	70th Percentile	80th Percentile	90th Percentile
						Refinance					
GNMA	2001	6.97%	1.21	1.50	1.73	1.94	2.15	2.38	2.63	2.97	3.50
	2002	6.54%	1.09	1.40	1.64	1.86	2.08	2.32	2.60	2.95	3.52
	2003	5.83%	1.01	1.31	1.54	1.76	2.00	2.24	2.53	2.91	3.50
	2004	5.84%	1.05	1.40	1.67	1.91	2.16	2.43	2.75	3.14	3.75
	2005	5.87%	1.08	1.44	1.74	2.00	2.26	2.53	2.84	3.21	3.77
	2006	6.41%	1.45	1.77	2.03	2.27	2.50	2.75	3.02	3.35	3.82
GSE	2001	6.97%	1.04	1.31	1.53	1.73	1.94	2.17	2.44	2.78	3.31
	2002	6.54%	1.01	1.28	1.51	1.72	1.94	2.18	2.46	2.82	3.38
	2003	5.83%	0.97	1.25	1.48	1.70	1.92	2.17	2.47	2.86	3.47
	2004	5.84%	1.07	1.38	1.64	1.88	2.14	2.42	2.75	3.18	3.85
	2005	5.87%	1.21	1.57	1.86	2.14	2.43	2.74	3.09	3.55	4.23
	2006	6.41%	1.24	1.61	1.92	2.22	2.51	2.83	3.18	3.63	4.29
Portfolio Lender	2001	6.97%	0.40	0.69	0.99	1.27	1.54	1.83	2.15	2.55	3.14
	2002	6.54%	0.48	0.81	1.10	1.38	1.65	1.93	2.26	2.68	3.31
	2003	5.83%	0.53	0.86	1.14	1.40	1.68	1.98	2.33	2.78	3.46
	2004	5.84%	0.52	0.88	1.24	1.59	1.95	2.33	2.76	3.28	4.02
	2005	5.87%	0.43	0.71	1.07	1.48	1.90	2.33	2.80	3.34	4.08
	2006	6.41%	0.38	0.60	0.86	1.22	1.67	2.15	2.65	3.21	3.94
Private Mortgage Pool Issuer	2001	6.97%	0.75	1.18	1.48	1.74	2.00	2.25	2.55	2.91	3.46
	2002	6.54%	0.91	1.29	1.58	1.83	2.09	2.37	2.68	3.07	3.66
	2003	5.83%	0.98	1.36	1.65	1.92	2.19	2.48	2.82	3.24	3.88
	2004	5.84%	1.04	1.55	1.91	2.23	2.54	2.87	3.24	3.69	4.34
	2005	5.87%	0.91	1.57	2.00	2.36	2.71	3.06	3.45	3.90	4.55
	2006	6.41%	0.62	1.18	1.75	2.18	2.56	2.92	3.31	3.75	4.38

GNMA = Ginnie Mae. GSE = government-sponsored enterprise.
Note: Average annual interest rate is from the Freddie Mac Series of Monthly Average Commitment Rate and Points on 30-Year Fixed-Rate Mortgages.

using an interest rate of 6 percent, 100 basis points below 7 percent. A 60-basis-point increase in the ratio is equivalent to a 200-basis-point reduction to an interest rate of 5 percent, and a 90-basis-point increase in the M/Y ratio is obtained with a 300-basis-point reduction in the interest rate. Thus, as average annual interest rates declined by roughly 120 basis points over the period, from 7 to 5.84 percent, maximum M/Y leverage ratios for purchase loans rose to levels corresponding to a 200-basis-point reduction in interest in all but the GNMA sector, indicating a widespread general easing of underwriting in the conventional markets for high-leverage lending.

Moreover, Exhibit 5 shows that maximum M/Y leverage ratios for refinance loans increased by 16 to 38 basis points for loans funded by GNMA, 60 to 95 basis points for loans funded by the GSEs Fannie Mae and Freddie Mac, 50 to 90 basis points for loans funded by portfolio lenders, and 70 to 90 basis points for loans funded by private mortgage pool issuers. As noted previously, a

90-basis-point increase in the leverage ratio for a 6- to 7-percent interest rate loan is equivalent to a 300-basis-point reduction, to 3 or 4 percent, in the interest rate. Again, because the decline in average annual interest over the period was about 120 basis points and was only 50 basis points below 2001 levels in 2006, it appears that a substantial easing of underwriting occurred in the conventional markets for high-leverage refinance lending that went well beyond that observed for home purchase lending.

Exhibit 6 shows the distribution of spreads between home purchase M/Y ratios and refinance M/Y ratios by decile from 2001 through 2006. Observing the unshaded cells of the exhibit, one may note that the spread is generally positive (or near zero where negative) for all funding sources except private mortgage pool issuers and the GSEs in 2005 and 2006, indicating that, in general, higher income leverage was a necessity and was granted more often under standard underwriting practices when stretching for an initial home purchase.

Exhibit 6. Decile Distribution of Spread Between Purchase and Refinance Mortgage-to-Income Ratios for 2001 Through 2006

Funding Source	Year	Average Annual Interest Rate	10th Percentile	20th Percentile	30th Percentile	40th Percentile	50th Percentile	60th Percentile	70th Percentile	80th Percentile	90th Percentile
						Purchase M/Y—Refinance M/Y					
GNMA	2001	6.97%	0.25	0.24	0.23	0.22	0.20	0.18	0.15	0.09	− 0.04
	2002	6.54%	0.41	0.40	0.40	0.38	0.36	0.34	0.30	0.24	0.11
	2003	5.83%	0.54	0.58	0.59	0.59	0.58	0.57	0.54	0.48	0.36
	2004	5.84%	0.53	0.51	0.50	0.48	0.46	0.41	0.35	0.28	0.13
	2005	5.87%	0.50	0.47	0.44	0.40	0.37	0.33	0.28	0.22	0.11
	2006	6.41%	0.11	0.13	0.14	0.13	0.12	0.11	0.09	0.09	0.07
GSE	2001	6.97%	0.09	0.14	0.16	0.16	0.15	0.14	0.12	0.09	0.04
	2002	6.54%	0.19	0.24	0.27	0.28	0.28	0.27	0.26	0.23	0.17
	2003	5.83%	0.29	0.36	0.39	0.42	0.43	0.43	0.43	0.41	0.37
	2004	5.84%	0.20	0.24	0.25	0.25	0.24	0.22	0.19	0.15	0.05
	2005	5.87%	0.06	0.06	0.05	0.03	− 0.01	− 0.04	− 0.09	− 0.16	− 0.26
	2006	6.41%	0.03	0.01	− 0.02	− 0.07	− 0.11	− 0.16	− 0.22	− 0.30	− 0.38
Portfolio Lender	2001	6.97%	− 0.06	− 0.05	0.09	0.17	0.21	0.21	0.20	0.15	0.08
	2002	6.54%	− 0.11	− 0.12	0.07	0.19	0.25	0.27	0.27	0.24	0.17
	2003	5.83%	− 0.12	− 0.08	0.17	0.32	0.39	0.42	0.42	0.38	0.30
	2004	5.84%	− 0.06	− 0.08	0.15	0.26	0.28	0.25	0.20	0.12	0.02
	2005	5.87%	− 0.03	− 0.10	− 0.18	0.02	0.10	0.08	0.02	− 0.08	− 0.20
	2006	6.41%	− 0.01	− 0.04	− 0.06	0.17	0.25	0.19	0.11	0.02	− 0.03
Private Mortgage Pool Issuer	2001	6.97%	− 0.28	− 0.22	− 0.12	− 0.07	− 0.08	− 0.07	− 0.09	− 0.12	− 0.18
	2002	6.54%	− 0.46	− 0.38	− 0.14	− 0.06	− 0.03	− 0.03	− 0.04	− 0.07	− 0.14
	2003	5.83%	− 0.45	− 0.33	− 0.07	0.02	0.06	0.07	0.06	0.03	− 0.04
	2004	5.84%	− 0.51	− 0.71	− 0.43	− 0.30	− 0.27	− 0.27	− 0.29	− 0.34	− 0.41
	2005	5.87%	− 0.39	− 0.83	− 0.81	− 0.57	− 0.51	− 0.50	− 0.53	− 0.57	− 0.67
	2006	6.41%	− 0.16	− 0.52	− 0.83	− 0.56	− 0.51	− 0.51	− 0.55	− 0.61	− 0.72

GNMA = Ginnie Mae. GSE = government-sponsored enterprise. M/Y = mortgage-to-income ratio.

It is interesting to note, however, that the spreads for GSEs and private mortgage pool issuers switch dramatically in 2005 and 2006 from being positive for GSEs and near zero for private pool issuers to negative as the maximum leverage granted to refinancers increased by 50 to 60 basis points compared with that granted to purchasers.
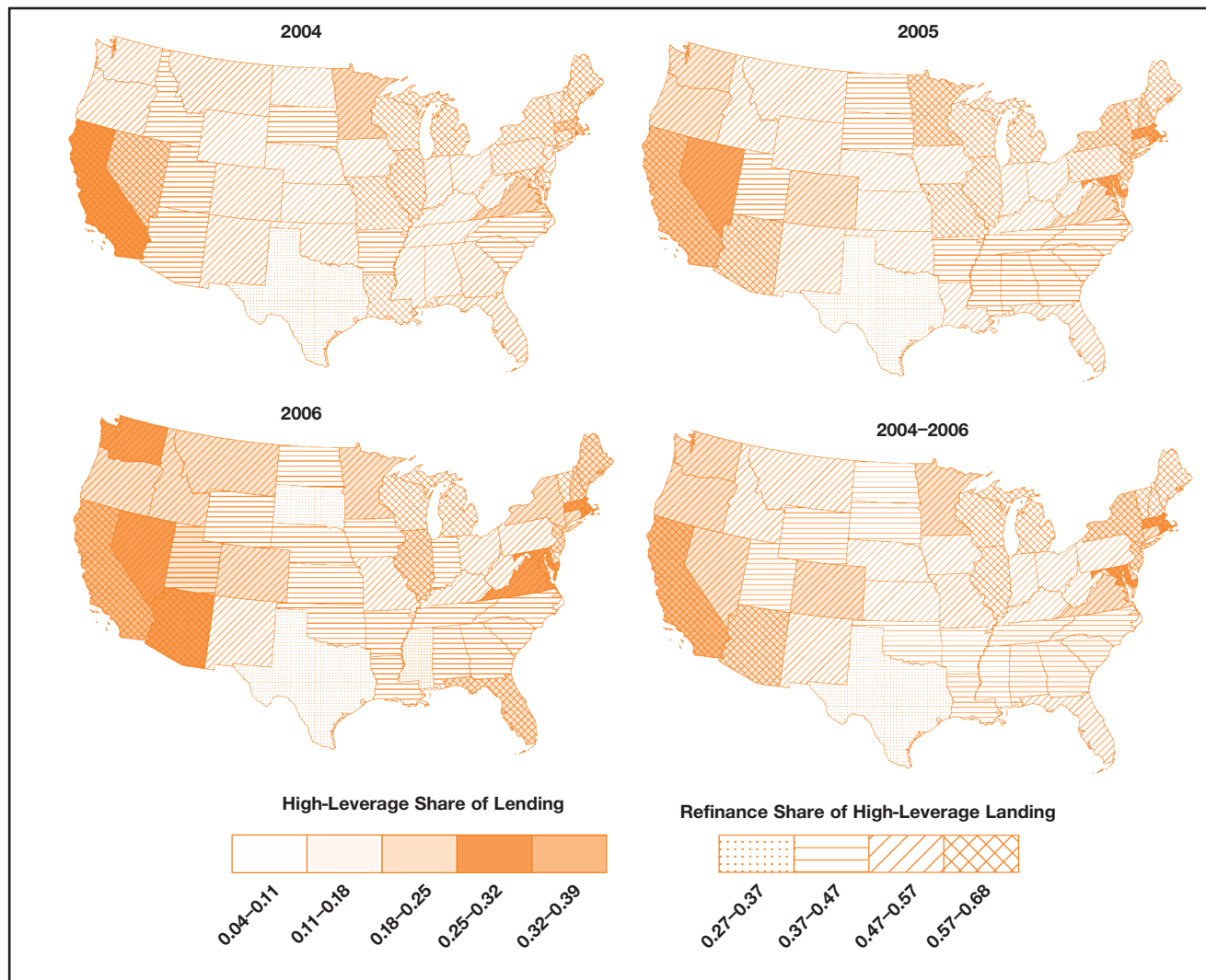
Thus, it would appear that much of today's current mortgage turmoil was triggered by widespread easing of the underwriting standards in conventional lending sectors that permitted borrowers to leverage their incomes beyond standards prevailing in 2001 and earlier, using qualifying advantages of short duration, such as ARMs with low teasers or other variations of ARMS with low introductory payments. Moreover, it appears that the relaxation of standards was most egregious in the refinancing sector, particularly among private mortgage pool issuers, where borrowers who already owned homes and whose circumstances would have permitted refinancing at considerably lower levels of leverage were permitted to stretch well beyond limits applied to those purchasing homes.

Exhibit 7 shows the state-by-state variation and growth over time of the high-leverage share of all lending and the refinance portion of that high-leverage lending across the United States from 2004 through 2006. In 2004, high-leverage lending accounted for less than 11 percent of all lending in nearly one-half of the states (shown with the lightest shading), while, by 2006, the most lightly shaded states where the share of high-leverage lending was less than 11 percent had declined to only eight states. The maps also show that the highest income leverage was granted on the west coast and in the northeastern states, with California having the highest occurrence of high-leverage lending of all the lower 48 states: 29, 37, and 36 percent in 2004, 2005, and 2006, respectively.[7] High-leverage lending was also prevalent in high-cost areas such as Washington, Nevada, and Arizona in the West and Massachusetts, Rhode Island, Maryland, the District

Exhibit 7. Mortgage Leverage and Refinance Activity in the United States

2004

2005

2006

2004–2006

High-Leverage Share of Lending

0.04–0.11   0.11–0.18   0.18–0.25   0.25–0.32   0.32–0.39

Refinance Share of High-Leverage Landing

0.27–0.37   0.37–0.47   0.47–0.57   0.57–0.68

of Columbia, and Virginia in the East. High-leverage refinance activity in the lower 48 states was greatest in Rhode Island in 2004 and 2005 and greatest in California in 2006. Other states in which refinance activity constituted more than 57 percent of high-leverage lending in 2006 include Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, New Jersey, Maryland, the District of Columbia, Florida, Michigan, Wisconsin, Illinois, Arizona, and Hawaii.

Thus, the more heavily shaded areas of the maps identifying states where high-leverage lending activity has been greatest also indicate where the potential for re-payment problems and subsequent foreclosure problems are likely to be highest as low introductory interest

rates expire. As the temporary qualifying interest rate expires and reprices to market, the mortgage payment and the associated new FER is carried well above the original qualifying payment-to-income ratio in order to remain consistent with the M/Y leverage embodied in the mortgage contract. (Note in Exhibit 1 that for a loan originally underwritten at 3.5 percent interest and a FER of 0.30, the FER must rise to 0.40 to preserve the same M/Y leverage of 4.36 as the interest rate rises to market at 6.5 percent.) The map for 2006 and the consolidated map reflecting lending for all 3 years are in reasonably close alignment with maps and information based on other data that show where delinquency and foreclosure problems have been greatest.[8]

The preceding analysis indicates that a substantial weakening of underwriting standards, particularly for refinancing, and a significant shift to higher leverage mortgage lending occurred between 2004 and 2006, particularly for borrowers purchasing or refinancing their homes with high-cost loans. Moreover, borrowers were disproportionately much more likely to use high-leverage loans in both the high- and low-cost sectors to refinance rather than purchase their homes. Although minority and low-income borrowers were disproportionately more likely to use high-leverage lending in the high-cost sector to purchase and refinance their homes, higher income borrowers were also well represented in high-leverage lending in both high- and low-cost sectors. Certainly, more careful and controlled analysis is necessary; however, it does not appear on the face of it that evidence supports the assertions of some that limited government policies advancing homeownership or affordable housing goals are responsible for the current mortgage market turmoil. The causes are likely more complex and broad in nature.

Notes

[1] The authors, William J. Reeder and John P. Comeau, thank Ismail Mohamed, Jian Zhou, and John Mubiru for valuable assistance with this project.

[2] With automated underwriting, lenders have been more willing to relax the FER requirement, which is why we subsequently choose 0.30 rather than 0.28, which was traditional for years, and allow for as much as a percentage point reduction below market interest when setting a demarcation threshold between high and low leverage.

[3] Loans are actually classified high cost if a positive APR spread is reported in HMDA data. Analysis of HMDA APR spreads of 3 percentage points or more over prevailing Treasury rates and Freddie Mac commitment rates pointed to an approximate dividing line of 7 percent.

[4] The loans analyzed in this article are HMDA purchase and refinance loans for one- to four-family homes (excluding manufactured homes).

[5] See Avery, Brevoort, and Canner (2006: A141-A152).

[6] Ibid, A-144.

[7] High-leverage lending (and high-leverage refinancing) activity in Hawaii and Alaska (not shown in Exhibit 7) was as follows: Hawaii—31, 37, and 39 percent (and 61, 62, and 60 percent); Alaska—13, 16, and 22 percent (and 37, 38, and 41 percent) in 2004, 2005, and 2006, respectively.

[8] See http://www.newyorkfed.org/newsevents/news/regional_outreach/2008/an080401.html and http://www.newyorkfed.org/mortgagemaps/current/.

Reference

Avery, Robert B., Kenneth P. Brevoort, and Glenn B. Canner. 2006. "Higher-Priced Home Lending and the 2005 HMDA Data," *Federal Reserve Bulletin 92* (September): A123–A166.