CHAPTER 1

Overview of the Nonagency Mortgage Market

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In this chapter we look at the major types of nonagency mortgage product, along with their defining characteristics and the variation in issuance volumes.

The value of residential 1–4 family real estate in the United States is $23 trillion. Against this, there is $10.7 trillion in mortgage debt, with the remaining 53% ($12.3 trillion) representing homeowner equity. That equity value is created because either a homeowner has no mortgage on their home, or the home's value exceeds the mortgage (via any combination of mortgage paydown, home price appreciation, or loan-to-value mortgage issuance).

Of the $10.7 trillion in residential mortgage debt, $6.3 trillion (58%) has been securitized. The securitized portion can be broken down into *agency mortgages* and *nonagency mortgages*. Agency mortgages are those guaranteed by either the Government National Mortgage Association (Ginnie Mae), a U.S. government agency, or one of the *government-sponsored enterprises* (GSEs), Fannie Mae or Freddie Mac. Nonagency mortgages are mortgages that, for a variety of reasons, do not meet underwriting criteria required by the agencies. Mortgages that fail to meet the underwriting standards of the agencies are said to be nonconforming mortgages.

Exhibit 1.1 shows that in 2007, agency mortgages represented approximately 66% of the securitized market, with the remaining 34% consisting of nonagency mortgages. The nonagency share contains jumbo prime (8% of the total), alternative-A or Alt-A (13%), and subprime (13%). While we will discuss in more detail later, jumbo prime mortgages are those whose are too large in size in qualify for Ginnie Mae, Fannie Mae, or Freddie Mac programs. Alt-A mortgages and subprime mortgages generally have more risk layering than standard agency *mortgage-backed securities* (MBS), while subprime borrowers are generally lower in credit quality than the borrowers backing agency MBS. On the nonsecuritized portion of the market, we do not have any information on the distribution of outstandings. (We do not know what percentage is prime, subprime, and Alt-A, which explains why market participants have seen widely divergent estimates on component sizes.)

EXHIBIT 1.1 Outstanding Mortgage Securities

						Value of residential 1–4 family real estate: $23 Trillion				
							% of Total MBS			
Year	GNMA	FHLMC	FNMA	Total Agency	Nonagency	Total MBS	% Agency	% Nonagency	1–4 Mtg. Outstanding	MBS as % of Total Mtg. Outstanding
1992	419,516	401,525	560,471	1,381,512	142,265	1,523,777	91%	9%	2,954,396	52%
1993	414,066	434,499	638,780	1,487,345	167,899	1,655,244	90%	10%	3,113,834	53%
1994	450,934	460,656	681,237	1,592,827	183,002	1,775,829	90%	10%	3,291,540	54%
1995	472,283	512,238	735,170	1,719,691	193,759	1,913,450	90%	10%	3,459,184	55%
1996	506,340	551,513	801,025	1,858,878	215,357	2,074,235	90%	10%	3,682,790	56%
1997	536,810	576,846	854,782	1,968,438	253,804	2,222,242	89%	11%	3,917,569	57%
1998	537,431	643,465	977,708	2,158,604	321,869	2,480,473	87%	13%	4,274,301	58%
1999	582,263	744,619	1,097,707	2,424,589	353,660	2,778,249	87%	13%	4,699,578	59%
2000	611,553	816,602	1,197,298	2,625,453	385,501	3,010,954	87%	13%	5,126,531	59%
2001	591,368	940,933	1,442,230	2,974,531	463,217	3,437,748	87%	13%	5,677,996	61%
2002	537,888	1,066,303	1,708,409	3,312,600	544,055	3,856,655	86%	14%	6,436,575	60%
2003	473,738	1,129,540	1,790,743	3,394,021	664,005	4,058,026	84%	16%	7,226,763	56%
2004	441,235	1,193,683	1,832,535	3,467,453	1,049,767	4,517,220	77%	23%	8,284,980	55%
2005	405,246	1,321,268	1,881,435	3,607,949	1,536,627	5,144,576	70%	30%	9,323,217	55%
2006	410,196	1,468,608	2,026,107	3,904,911	1,991,459	5,896,370	66%	34%	10,359,047	57%
2007-Q2	417,216	1,585,752	2,145,723	4,148,691	2,120,175	6,269,866	66%	34%	10,749,703	58%

Out of the 34% Nonagency	
Alt-A	13%
Prime	8%
Subprime	13%

Note: Estimates in italics.
Source: Inside MBS & ABS, LoanPerformance, and UBS.

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ISSUANCE VOLUMES

Exhibit 1.2 shows the main sectors of MBS that we discuss and their respective issuance volumes from 1995 to the third quarter of 2007. Note that between 1995 and 2003, the agency share of mortgage issuance ranged from 75% to 85%. The nonagency share (15% to 25%) was comprised of jumbo, Alt-A, subprime, and "other," with the jumbo prime share the largest portion.

The agency share of issuance dropped to 54% in 2004, and then further to 45% in 2005 and 2006. The declining agency share during from 2004 to 2006 was accompanied by a large increase in subprime and Alt-A issuance. For example, the subprime share rose from 7% in 2003 to 19% to 22% in 2004 to 2006. The Alt-A share increased from 3% in 2003 to 15% to 18% in 2005 and 2006.

ROOTS OF THE 2007–2008 SUBPRIME CRISIS

Therein lies the roots of the subprime crises. The decline in agency issuance during 2004–2006, mirrored by a rise in subprime and Alt-A issuance, reflected the drop in housing affordability during this period. The reason for the drop in housing affordability was a rise in interest rates from their mid-2003 lows in conjunction with the continued rise in housing prices. Exhibit 1.3 shows the Freddie Mac Conventional Home Price Indices and the Case Shiller Home Price Indices. Notice the large run-up in *home price appreciation* (HPA) during 2003–2005; we clearly see that housing became less and less affordable.

The most commonly used measure of housing affordability is the National Association of Realtors Housing Affordability Index. This index, shown in Exhibit 1.4, measures the ability of a family earning the median income to buy a median-priced home. This calculation is critically dependent on three inputs: median family income, median home prices, and mortgage rates. It assumes a family earning the median family income buys the median priced home, puts down 20%, and takes out a 30-year conventional mortgage for the remaining 80% of the house value at prevailing interest rates.[1] If payments on a 30-year conventional mortgage consume 25% of a borrower's income, then the index has a value of 100. Our sample calculation consists of:

Median family income = $60,000 per year; $5,000 per month
Median priced home = $224,000
Downpayment = 20% × $224,000 = $44,800

[1] A *conventional mortgage* is one that is not guaranteed by an agency or government-backed insurance.

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EXHIBIT 1.2 MBS Gross Issuance

Date	Agency ($ million)	Nonagency ($ million)				Total MBS ($ million)	% of Total					
		Alt-A	Jumbo	Subprime	Other		Agency	Alt-A	Jumbo	Subprime	Other	Nonagency
1995	269,132	498	25,838	17,772	4,818	318,058	84.6	0.2	8.1	5.6	1.5	15.4
1996	370,648	1,803	31,419	30,769	5,903	440,541	84.1	0.4	7.1	7.0	1.3	15.9
1997	367,884	6,518	49,975	56,921	5,719	487,016	75.5	1.3	10.3	11.7	1.2	24.5
1998	725,952	21,236	97,365	75,830	8,780	929,163	78.1	2.3	10.5	8.2	0.9	21.9
1999	685,078	12,023	74,631	55,852	5,394	832,977	82.2	1.4	9.0	6.7	0.6	17.8
2000	479,011	16,444	53,585	52,467	13,463	614,970	77.9	2.7	8.7	8.5	2.2	22.1
2001	1,087,499	11,374	142,203	87,053	26,691	1,354,819	80.3	0.8	10.5	6.4	2.0	19.7
2002	1,444,426	53,463	171,534	122,681	66,277	1,858,381	77.7	2.9	9.2	6.6	3.6	22.3
2003	2,131,953	74,151	237,455	194,959	79,653	2,718,170	78.4	2.7	8.7	7.2	2.9	21.6
2004	1,018,684	158,586	233,378	362,549	109,639	1,882,836	54.1	8.4	12.4	19.3	5.8	45.9
2005	964,697	332,323	280,704	465,036	113,247	2,156,007	44.7	15.4	13.0	21.6	5.3	55.3
2006	924,637	365,676	219,037	448,600	112,139	2,070,089	44.7	17.7	10.6	21.7	5.4	55.3
2007-9M	860,909	235,995	161,190	189,464	63,908	1,511,465	57.0	15.6	10.7	12.5	4.2	43.0
2007-Q1	265,208	96,873	60,333	88,554	26,148	537,116	49.4	18.0	11.2	16.5	4.9	50.6
2007-Q2	288,743	100,916	60,567	74,694	22,288	547,207	52.8	18.4	11.1	13.6	4.1	47.2
2007-Q3	306,958	38,206	40,290	26,216	15,472	427,142	71.9	8.9	9.4	6.1	3.6	28.1

Source: Inside MBS & ABS and UBS.

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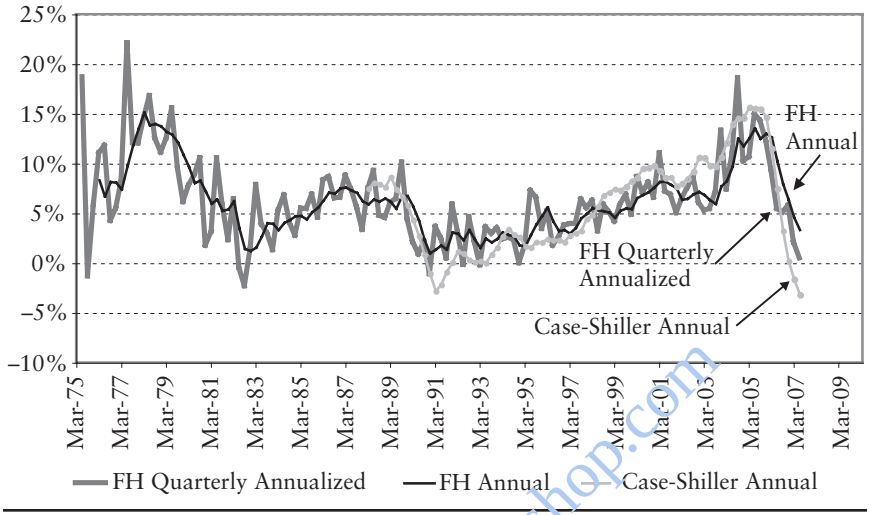
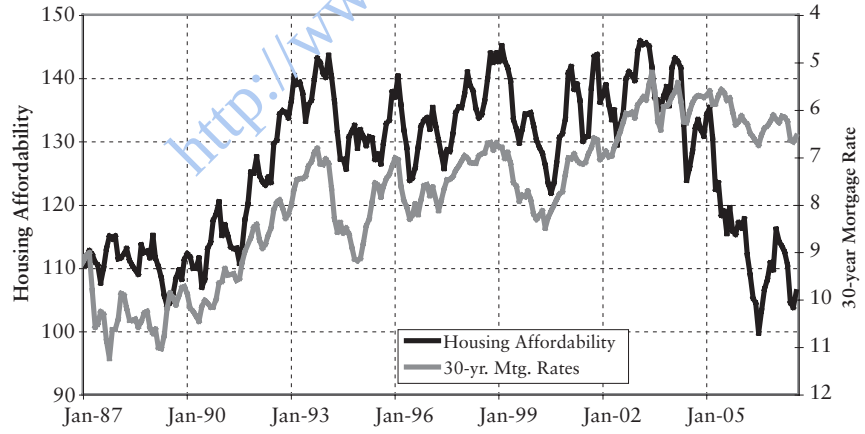
EXHIBIT 1.3 Home Price Indices



Note: Latest data: Q2 2007; quarterly FH annualized = 0.4%; FH annual = 3.3%; CS Annual = –3%.
Source: Freddie Mac.

EXHIBIT 1.4 Housing Affordability versus 30-year Mortgage Rates



Note: Latest is estimated: August 2007; housing affordability = 106.1; 30-year mortgage rate = 6.57%.
Source: National Association of Realtors and Freddie Mac.

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Mortgage = 80% × $224,000 = $179,200
Mortgage rate = 6.50%
Mortgage payment 30-year fixed rate mortgage
= $1,133 ($179,200 mortgage at 6.5%)

So the National Association of Realtors' calculation is:

25% of Median family income/Mortgage payment on median-priced home
= 25% × $5,000/$1,133 = 110.3

Home prices rose during the 2001–2003 period, but that rise was offset by the drop in interest rates, leaving housing affordability in the range of 129 to 146. However, mortgage rates rose from late 2003 through 2006, and housing values also rose, thus producing a sharp drop in housing affordability to a low of 99.6 by June 2006.

In order to maintain market share, originators began to relax origination standards. *Combined loan-to-value ratios* (CLTVs) rose (indicating a heavy use of second mortgages), the interest-only share rose, and documentation dropped. In the next section of this chapter, we examine the loan characteristics of jumbo, Alt-A, and subprime sectors, and quantify the drop in origination standards.

The fall in the agency share between 2004 and 2006 reflected that:

1. Fannie Mae and Freddie Mac were slow to embrace "affordability" products such as *interest only loans* (IOs).
2. Both GSEs were reluctant to guarantee loans too far down the credit spectrum, and reluctant to guarantee mortgages with too much risk layering.
3. Even when agency execution was possible, agency risk-based pricing resulted in execution that was usually worse than nonagency execution.

Thus, most of the mortgage affordability products received nonagency execution. But subsequently in 2007 when nonagency execution channels became more costly, originators again sought agency execution.

The relaxation in origination standards was fine as long home prices were appreciating. When a borrower ran into difficulty, selling the home at a profit was a much better option than defaulting. However, in mid-2006 housing began to weaken. Existing home sales fell; home prices were stagnant and then began to decline. Vacant homes for sales hit a multiyear high and delinquencies began to rise.

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In 2007, as the subprime crises emerged and intensified, the agency share rose, while subprime and Alt-A shares fell. During 2007, it had become very difficult to obtain a subprime or Alt-A mortgage. Origination capacity was cut considerably. Most subprime originators without deep-pocketed parent companies went out of business, and either ceased operations or were acquired. Moreover, even the remaining originators made very few subprime and Alt-A loans, as the securitized markets for these products had dried up. Investors who had historically purchased securities backed by pools of subprime and Alt-A mortgages were no longer willing to purchase the securities, at least not at rate levels that borrowers could afford to pay. Thus, originators had no one to sell the loans to and did not have the balance sheet capacity to warehouse these loans. As a result, many originators stopped making loans that did not qualify for agency guarantees and by mid-2007 the mortgage market was again dominated by the agencies.

DEFINING CHARACTERISTICS OF NONAGENCY MORTGAGES

Exhibit 1.5 presents the main characteristics of different sectors of the agency and nonagency market. It covers such loan and borrower characteristics as loan size, average FICO score, average LTV and CLTV, occupancy (owner versus investor), documentation (full versus nonfull), loan purpose (cash-out, cash-out refi, or rate refi), the percent in adjustable rate mortgages, the IO percent, and *debt-to-income* (DTI) ratio.

The nonagency sectors of the MBS market are defined by how they differ from agency collateral. *Jumbo prime mortgages* generally have higher FICO scores than agency mortgages. However, their main distinguishing characteristic is *size*; these loans exceed the conforming sized limit, $417,000 in 2007. The *Alt-A loans* may be conforming or nonconforming in terms of size. These mortgages tend to be of good credit as measured by their FICO score (approximately 710). Their distinguishing characteristic is the low percentage (23%) of borrowers who *fully document their income*. The distinguishing characteristic of *subprime* borrowers is their *FICO* score; averaging in the 620s, it is much lower than other borrower types.

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LOAN CHARACTERISTICS

These loan characteristics collectively determine the prepayment and credit performance of each MBS deal. We now look at these characteristics in greater detail.

EXHIBIT 1.5 Loan and Borrower Characteristics by Product Type

	Agency	Jumbo Prime	Alt-A	Subprime
Lien	1st	1st	1st	1st
Loan limit	≤ Agency	> Agency	None	None
Average loan size	221,301	509,913	293,719	185,451
2006 Avg. loan size	230,403	577,022	320,828	210,472
Credit	Agency	A	A/A–	A–/C
Average FICO	725	739	712	628
2006 Avg. FICO	723	740	708	626
Average LTV	71	69	74	81
2006 Avg. LTV	73	71	75	81
Average CLTV	—	71	80	86
2006 Avg. CLTV	—	75	82	87
Occupancy (owner)	95%	99%	85%	95%
Full documentation	—	50%	23%	60%
Loan purpose				
Purchase	39%	46%	46%	40%
Cash out	59%	23%	36%	53%
Rate refi		30%	18%	7%
IO	9%	45%	43%	20%
ARMs	12%	52%	63%	73%
DTI	—	33%	36%	41%

Source: Fannie Mae, Freddie Mac, and LoanPerformance.

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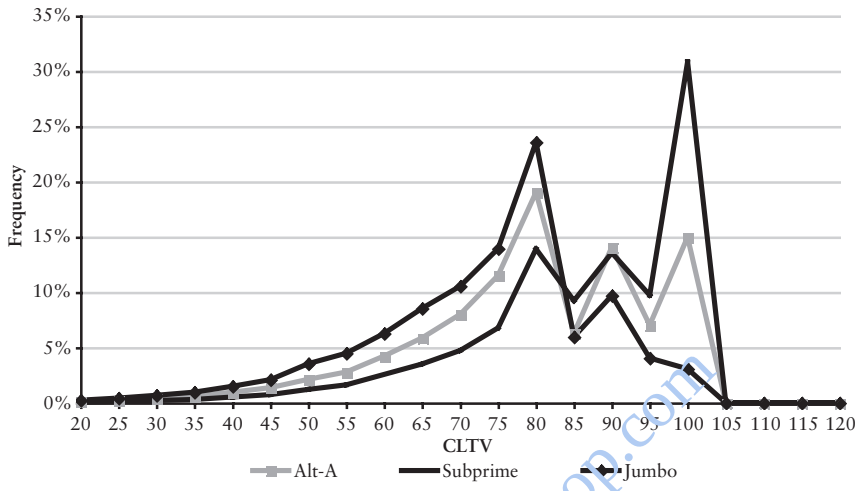
Combined Loan-to-Value Ratio

The CLTV ratio is the single most important factor determining credit performance on a loan. The *loan-to-value* (LTV) ratio refers to the loan amount divided by the value of a home. Thus, if there is a $160,000 loan (mortgage) on a $200,000 home, we would say the LTV ratio is 80% ($160,000/$200,000). The CLTV ratio is the sum of the first and second mortgages divided by the home's value. Thus, if there is a $160,000 first mortgage and a $30,000 second mortgage] against a $200,000 home value, we would say the borrower has a CLTV ratio of 95% ($190,000 mortgages/$200,000 value of home).

EXHIBIT 1.6 2006–2007 CLTV Distribution



Source: LoanPerformance.

A high CLTV typically indicates that the buyer has stretched to buy a home, and could not put down as much as other borrowers. A high CLTV is often associated with a high DTI ratio as well as other weak credit indications.

In the agency world, any loan that exceeds 80% LTV requires *private mortgage insurance* (PMI). In the nonagency world, higher risk mortgages such as subprime and Alt-A typically have higher LTVs than is seen in agency pools. Exhibit 1.6 shows a distribution of the CLTVs on 2006 and 2007 jumbo, subprime, and Alt-A pools. Note that in both Alt-A and subprime pools there is a considerable percentage of loans with CLTVs in excess of 95%. Note also that this percentage is higher in subprime pools than in Alt-A pools.

Loans with higher CLTV ratios have higher delinquencies and higher loss severities. Those delinquencies and loss severities increase due to home price depreciation. Assume that a $200,000 house drops in value by 10% and is thus worth only $180,000. The borrower with a $160,000 first mortgage and a $30,000 second mortgage (mortgages total $190,000) will have little reason *not* to default on that home. The more the home depreciates in value, the higher the loss severity.

It is also important to realize that in a lower home price appreciation environment, loans with higher CLTV ratios will prepay more slowly, as they have fewer refinancing opportunities.

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FICO Scores

Credit scores have been used in the consumer finance industry for several decades. Over the past decade, they have become an increasingly important part of assessing mortgage credit.

A credit score is an empirically derived quantitative measure of the likelihood that a borrower will repay a debt. Credit scores are generated from models that have been developed from statistical studies of historical data, and use as inputs details from the borrower's credit history. FICO scores are tabulated by an independent credit bureaus, using a model created by Fair Isaac Corporation (FICO). These scores range from 350 to 900, with higher scores denoting lower risk.

FICO scores have been shown to play an important role in determining both delinquencies and prepayment speeds. Lower FICO mortgages default at a much higher rate than their higher FICO counterparts, and exhibit much higher losses. On the prepayment side, it has historically been the case that lower FICO borrowers prepay much faster than higher FICO counterparts. That's because a low credit borrower who stays current on consumer and mortgage loans for a year may be able to refinance at a lower rate. Thus, refinancing due to "credit curing" has historically been the source of relatively high base-case speeds on subprime loans. In addition, many borrowers had refinanced as a way to tap into the equity on their home, which had increased in value. With the subprime crisis limiting the availability of credit to these borrowers, and home prices falling, voluntary prepayments fell sharply in 2007. Providing a modest cushion, involuntary prepayments (defaults are passed through as a prepayment) rose.

Moreover, lower FICO pools tend to be much less sensitive to changes in interest rates. This reflects the fact that in a refinancing, lower credit borrowers face higher closing costs and points.

Exhibit 1.5 shows that the average FICO scores are 725, 739, 712, and 628 for agency, jumbo, Alt-A, and subprime, respectively. It's important to realize that FICO scores alone do not sufficiently define a loan. This is clearly illustrated in Exhibit 1.7, which depicts the FICO distribution. Note that approximately 18% of subprime loans have FICO scores that exceed 680, while 27% of the Alt-A loans have FICO scores that fall below 680.

Documentation

Documentation is generally defined as either *full documentation* ("full doc") or *limited documentation*. Full documentation generally involves the verification of income (based on the provision of W-2 forms) and assets (from bank statements). With limited documentation, either income or as-

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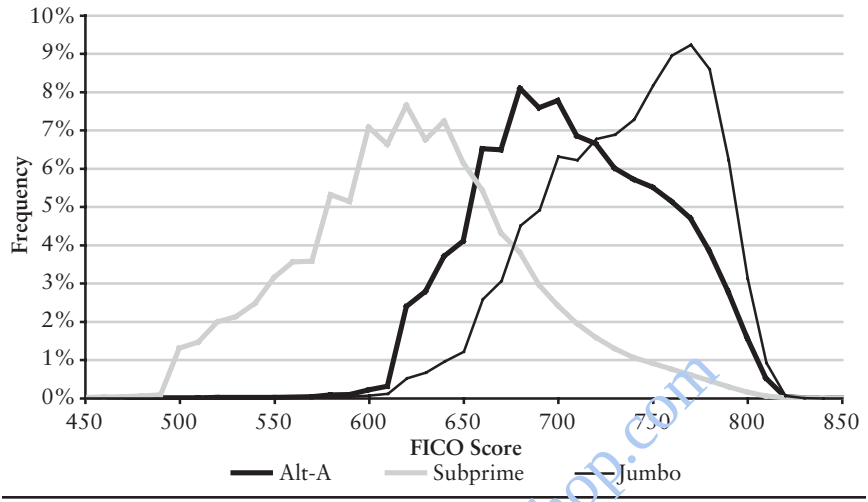
EXHIBIT 1.7 FICO Distribution



Source: LoanPerformance.

sets are not verified. Limited documentation can take many forms, including SISA (stated income, stated assets), NISA (no income (income not provided, stated assets), No Ratio (income not provided, assets verified). Each originator has its own definition of limited documentation. Moreover, originators differ considerably in the degree to which they attempt to ferret out stated income borrowers that are clearly lying. Some originators verify employment for stated income borrowers; others do not. Some originators go a step further and make sure the income is reasonable for the occupation specified; others do not perform that step.

Limited documentation is the key feature in defining Alt-A product. In fact, the Alt-A market originally arose to accommodate borrowers who owned their own business and lacked traditional documentation such as employment and income verification. Then, in the late 1990s, the agencies began to accept limited documentation for borrowers with higher FICO scores and lower LTVs, and the jumbo market followed suit. Note that the limited documentation was historically accompanied by compensating factors. However, from 2004 to 2006, documentation standards were relaxed considerably, without requiring any type of compensating factors.

Limited documentation loans tend to have higher default rates than full documentation loans. Moreover, limited documentation tends to be highly correlated with other risk factors (higher LTV, lower FICO, higher DTI). Documentation alone tends to be of secondary importance as a determinant of prepayment stability.

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Loan Size

All agency loans for single family homes must be less than the conforming loan limit of $417,000.[2] The loan limit is reset annually, based on October-to-October changes, as measured by the Federal Housing Finance Board (FHFB). Even though the limit is $417,000, the average loan size is much smaller; by the third quarter of 2007 it was approximately $225,000 for new origination.

Loans carrying agency credit and meeting all other agency credit criteria except size are referred to as jumbo prime loans. (Often they are refereed to as either "jumbo" or "prime"). The average size of jumbo loans is $510,000. (However, that includes loans extended when the loan limit was smaller; e.g., the loan size limit in 2003 was $322,700. The average loan size for 2006 jumbo origination was $577,000.

Alt-A loans can be either conforming or nonconforming. Their average size of $294,000 falls midway between that of agencies and jumbos. Approximately 25% (as measured by number) of Alt-A mortgages issued in 2006, and 50% (as measured by balances) were nonconforming in terms of size.

Subprime loans are typically similar in size to agency loans. However, there is a substantial minority of loans that are nonconforming in terms of size. Thus, 6% of subprime mortgages issued in 2006 (measured by number) and 20% (measured by balances) were nonconforming in terms of size. This is clearly shown in Exhibit 1.8 which illustrates the size distribution of jumbo, Alt-A, and subprime loans.

Loan size is important in understanding both delinquency and prepayment characteristics. Note that smaller loans are less prepayment-sensitive than loans with larger balances. This reflects the fact that the fixed costs of refinancing have a larger impact on smaller mortgages. Smaller loans also tend to have higher losses than larger loans, reflecting the higher fixed costs of liquidation.

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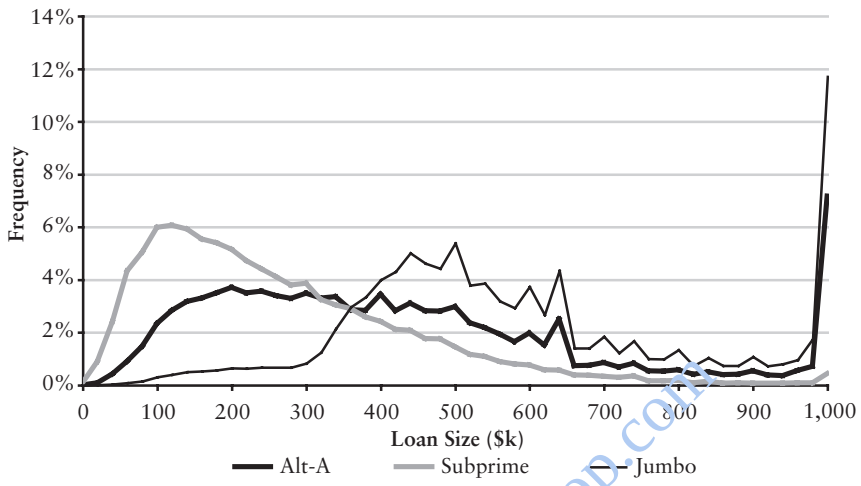
Loan Purpose

Loan purpose can take one of three forms: *purchase*, *refi*, or *cash-out refi*. Historically, loan purpose has not been that important in determining either default or prepayment behavior. However in the 2004–2006 period, purchase loans had much more risk layering than did either refi or cash-out refis. That is, borrowers stretched to buy their homes, and these purchase loans were far more apt to have higher DTI ratios, higher CLTVs, and higher proportions of second mortgages and interest-only or 40-year mortgages.

[2] The limit is greater for 2–4 unit homes, and single family homes located in Alaska, Hawaii, Guam, and the Virgin Islands.

EXHIBIT 1.8 Loan Size Distribution



Source: LoanPerformance.

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Debt-to-Income Ratio

While a borrower's FICO score is used as an indicator of an individual's *willingness* to repay their loan, DTI is used as a measure of their *ability* to repay it. Two DTI ratios are commonly used in mortgage underwriting: *front-end DTI* and *back-end DTI*. The front-end ratio divides a homeowner's housing payments (including principal, interest, real estate taxes, and home insurance payments) by gross income. A back-end ratio divides total monthly debt payments (including housing-related payments plus all credit card and auto debt, as well as child support payments) by gross income. In practice, FICO and DTI tend to be highly correlated. Exhibit 1.5 indicates that jumbo mortgages have an average FICO of 739 and a back-end DTI of 33%. Alt-A mortgages have an average FICO of 712 and a DTI of 36%, while subprime mortgages have an average FICO of 628 and an average DTI of 41%.

For mortgages guaranteed by Ginnie Mae, 31% is the maximum acceptable front-end ratio and 43% the maximum acceptable back-end ratio. Some exceptions may be made for compensating factors such as a low LTV ratio or sizable assets. For mortgages guaranteed by Fannie Mae and Freddie Mac, as well as for nonagency product, there are no absolute cutoffs because risk-based pricing is used.

High DTIs are one more indicator that borrowers stretched to buy their home, and are therefore at a higher risk of default than borrowers with low DTIs.

Adjustable Rate Mortgages

The standard *adjustable rate mortgage* (ARM) is fixed for a period of time, and floats thereafter. In agency, Alt-A, and jumbo lending, the standard ARM is fixed for 3, 5, 7, or 10 years, and resets annually thereafter. Five years is the most common time to reset, with both 7- and 10-year terms more popular than the three-year term. During the floating period, the loan is generally indexed to either one-year CMT (constant maturity Treasury) or one-year LIBOR (London Interbank Offer Rate). Thus, if the loan is indexed to one-year CMT, it will reset to 1-year CMT + a prespecified margin. These loans are often referred to as *hybrid ARMs*, or in the case of a mortgage with the rate fixed for five years, a 5/1 hybrid ARM. The 5 in this case refers to the initial rate lock period. The 1 refers to the fact that it resets annually thereafter.

It is important to realize that the mortgages have caps to control payment shock for the borrower. The most common cap on a 5/1 hybrid is a 5/2/5 cap. That is, the loan rate can rise 5% at the first reset, 2% at each subsequent reset, and is subject to a life cap of 5%.

Another type of ARM is the *option ARM*. Option ARMs generally have low initial payments, and the payment caps limit the amount the payments can be raised. These mortgages often accrue at a higher rate than the borrower is paying. Thus, the loans are experiencing negative amortization—that is, their balances are growing. At the end of 60 months, or when the loan reaches the negative amortization limit (110%, 115% or 125%), whichever comes first, the loan will recast and then will fully amortize over the remaining term.

In subprime, the most common ARMs are the 2/28 or 3/27. The 2/28 (3/27) has a rate fixed for a two-year (three-year) period, and then floats at a rate of approximately LIBOR + 600. The floating rate is readjusted every six months, subject to a 2% or 3% initial cap, a 1% cap at each reset, and a life cap of 6% over the initial rate. Let us assume the borrower took out a 2/28 mortgage at an initial rate of 8%, and LIBOR remained constant at 5%. Thus, the fully indexed rate would be 11% (5% LIBOR + 600). At the reset in two years, the rate would jump to 10% (it would hit its 2% cap); it would hit its fully indexed 11% rate at the second reset in 2.5 years.

Borrowers taking out ARMs are generally looking to lower their monthly payment. ARM borrowers generally have more risk layering than their fixed rate counterparts, and hence have higher defaults. They generally have higher CLTV ratios, leading to higher loss severity.

ARM borrowers have historically prepaid faster than their fixed rate counterparts, as many ARM borrowers have a shorter expected tenure in their home. They are willing to take a rate fixed for five years rather than 30 years, as they believe that in three to five years they will trade up to a larger home.

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Interest-Only Mortgages an 40-Year Mortgages

Interest-only mortgages are mortgages in which the borrower does not pay principal for a period of time. For 30-year fixed rate mortgages, the interest-only period is generally 10 years; the borrower then pays off the principal over the remaining 20 years. For adjustable rate mortgages, the interest-only period is generally the same or longer than the initial fixed period. For example, a hybrid ARM with a 30-year mortgage term and an initial interest rate that is fixed for five years may have a 5-year interest-only period, a 7-year interest-only period; or a 10-year interest-only period. 40-year mortgages are mortgages with 40-year terms rather than the standard 30-year term.

Both interest-only mortgages and 40-year mortgages are *affordability products*—products designed to lower a borrower's monthly payment. The monthly payment on a $200,000 30-year fixed rate mortgage with a 6.5% interest rate would be $1,264. If the mortgage was interest-only for the first 10 years, the monthly payments during that time would be $1,083, which is $181 or 14.3% lower than on an amortizing mortgage. However, once the 10-year interest-only period ends, the payment jumps to $1,491, as the borrower must then pay down the principal over a 20-year period. Payments on a 40-year mortgage would be $1,171, which is $93 or 7.4% less than on a traditional 30-year mortgage.

Borrowers taking out interest-only mortgages or 40-year mortgages tend to have higher defaults than those who use conventional 30-year mortgages, as it is one more manifestation that the borrower is stretching to buy the house. Prepayment behavior on interest-only mortgages tends to be fairly similar to that on amortizing mortgages.

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Occupancy

Pools of Alt-A mortgages tend to have a higher percentage of investor properties than do jumbo or agency pools. Subprime mortgages tend to have a higher percentage of investor properties than jumbo pools, but less investor properties than in Alt-A pools. In the 2004–2006 period, questions were raised about the accuracy of the percentage of investor properties in pools. It is widely believed that many investors stated that their properties were owner-occupied, when in fact they were not, causing an underestimate of investor share.

Occupancy is important in understanding credit performance. Loans with a higher percentage of investor properties tend to default more often, and they also experience higher loss severities when they default. Investor properties also tend to have somewhat more stable prepayment profiles. That is, as interest rates drop, they are slightly less apt to refinance.

Summary

While all the factors we discussed play some role in both credit performance and prepayment behavior, the three major determinants of credit performance are CLTV, FICO, and documentation. The the most important determinants of prepayment stability are loan size, FICO, and ARM versus fixed.

RISK LAYERING

We are now in a position to quantify the slip in origination standards that occurred during the 2002–2006 period. Exhibit 1.9 tells the story. The table shows ARMs in the top section (jumbo, Alt-A, subprime, and option ARMs), and fixed rate product in the bottom section (jumbo, Alt-A, subprime). Note that option ARMs are Alt-A in terms of credit quality. However, because these instruments can experience negative amortization, they have a lower initial CLTV than do more traditional Alt-A hybrid ARMs, so including them with more traditional Alt-A hybrid ARMs would produce a misleading comparison versus other products.

First look at subprime ARMs. Note that from 2002 to 2006, CLTVs rose from 81% to 88%. This reflected a rise from 4% to 34% for piggyback second mortgages. The percentage of loans with CLTVs in excess of 90% rose from 27% in 2002 to 56% in 2007. The increase in interest-only mortgages from 1% to 10% is quite substantial, as was the rise in 40-year mortgages from 0% to 31%. The increase in affordability products was, in part, an effort to offset the effect of the rise in interest rates and the increase in home prices. Many borrowers stretched to buy their home, as evidenced by an increase in the purchase share from 33% to 46% and an increase in the DTI from 40% to 42%. The current DTI is probably understated, as many of the DTI calculations were based on stated income. (The full documentation percentage dropped from 66% to 53% over this period.)

The increase in risk layering is by no means a subprime phenomenon. Look at the increased risk layering in Alt-A ARM product. Note that from 2002 to 2006, CLTVs rose from 74% to 85%, reflecting a rise in piggyback second mortgages, from 4% to 53%. The percentage of mortgages with CLTVs that exceed 90% shot up from 15% to 49%. The percentage of interest-only mortgages rocketed from 30% to 82%, while the full documentation percentage dropped from 30% to 20%. The FICOs were largely unchanged.

In fact, no matter which set of numbers one looks at, the increase in risk layering is apparent.

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EXHIBIT 1.9 Collateral Characteristics

Product	Orig. Year	CLTV	% IO	% 40 Yr.	% Piggyback	% Purchase	% CLTV > 80	% CLTV ≥ 90	% Full Doc	FICO	DTI Back-end
Prime ARMs	2001	67	25	0	0	32	4	3	60	729	30
	2002	66	50	0	1	28	3	2	56	733	31
	2003	68	52	0	10	34	10	7	50	733	32
	2004	73	71	0	23	52	20	15	51	734	34
	2005	74	83	0	27	56	23	17	48	739	35
	2006	75	90	0	30	49	25	18	35	737	37
	2007	73	92	1	30	34	24	12	22	733	36
Alt-A ARMs	2001	74	17	0	2	47	22	16	32	704	35
	2002	74	30	0	4	46	21	15	30	707	34
	2003	78	57	0	24	59	34	27	28	708	35
	2004	83	76	0	39	61	47	40	33	709	36
	2005	84	83	0	48	64	52	45	28	713	37
	2006	85	82	2	53	60	56	49	20	710	38
	2007	84	85	3	47	49	54	47	15	712	39
Subprime ARMs	2001	81	0	0	4	34	45	25	71	598	40
	2002	81	1	0	4	33	47	27	66	605	40
	2003	84	6	0	11	35	56	38	63	613	40
	2004	85	21	0	20	40	61	45	59	619	41
	2005	87	33	8	29	46	64	51	55	626	41
	2006	88	20	31	34	46	69	56	53	623	42
	2007	85	19	28	20	34	64	49	57	618	42

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EXHIBIT 1.9 (Continued)

Product	Orig. Year	CLTV	% IO	% 40 Yr.	% Piggyback	% Purchase	% CLTV > 80	% CLTV ≥ 90	% Full Doc	FICO	DTI Back-end
Option ARMs	2001	68	0	1	0	33	2	1	31	721	31
	2002	69	0	1	1	37	2	1	32	720	28
	2003	71	0	5	7	30	10	5	27	702	32
	2004	73	1	5	13	34	14	8	22	699	32
	2005	77	0	9	25	38	27	18	17	710	35
	2006	79	6	29	34	29	38	27	10	709	35
	2007	78	24	22	27	22	32	21	10	714	37
Prime Fixed	2001	69	0	0	0	36	5	3	78	730	31
	2002	65	0	0	1	27	3	2	75	735	32
	2003	64	0	0	7	21	5	2	56	740	31
	2004	67	2	0	10	40	7	5	55	740	34
	2005	71	21	0	19	48	15	10	54	742	34
	2006	75	27	0	26	56	22	15	52	743	37
	2007	76	41	1	33	53	30	20	45	744	38

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EXHIBIT 1.9 (Continued)

Product	Orig. Year	CLTV	% IO	% 40 Yr.	% Piggyback	% Purchase	% CLTV > 80	% CLTV ≥ 90	% Full Doc	FICO	DTI Back-end
Alt-A Fixed	2001	77	0	0	2	46	26	20	32	703	35
	2002	74	1	0	3	43	22	16	34	711	36
	2003	72	3	0	8	33	23	17	33	712	34
	2004	76	11	0	15	47	30	24	36	711	36
	2005	77	34	0	28	46	33	27	35	715	37
	2006	80	38	3	37	48	42	36	22	708	38
	2007	78	44	4	30	38	36	30	22	714	39
Subprime Fixed	2001	78	0	0	1	21	42	22	74	622	38
	2002	79	0	0	1	19	42	25	67	635	39
	2003	79	0	0	3	18	45	27	67	640	39
	2004	80	2	0	6	22	46	30	69	640	39
	2005	82	6	3	9	26	53	38	68	638	40
	2006	84	6	14	11	30	58	45	67	633	41
	2007	80	5	18	6	16	50	33	70	622	41

Source: LoanPerformance.

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Exhibit 1.9 also makes the point that the risk layering was much less in fixed rate mortgages than it was in ARMs. This is true across the credit spectrum in jumbo, Alt-A, and subprime paper. It is most easily seen by looking at 2006 production Alt-A ARMs versus fixed. Compare the CLTV of 85% on the Alt-A ARMS to the CLTV of 80% on Alt-A fixed from the same vintage. This reflects the situation that 53% of the Alt-A ARMs have piggyback second mortgages versus 37% of the fixed. The interest-only mortgage share on the ARMs is 82% versus the fixed at 38%. The purchase share on the ARMs is higher (60% versus 48%), while the FICO scores and full documentation percentages are very similar.

AGENCY VERSUS NONAGENCY EXECUTION

Now return to Exhibit 1.2. Note the rise in the agency share in 2007. Ginnie Mae has marginally relaxed its standards through the introduction of the FHASecure program. This program allows borrowers who are delinquent as a result of the reset, but who were current for the six months before the reset and can meet the FHA's other conditions (such as DTI), to possibly qualify for an FHA mortgage. However, only a relatively small subset of borrowers met the criteria. By contrast, in early 2007, Freddie Mac and Fannie Mae left their standards as to which mortgages qualified for agency execution unchanged. As the year wore on, and home price depreciation became a reality, Freddie and Fannie tightened their standards and raised their pricing. The large increase in agency volume in 2007 reflected the fact that with the subprime and Alt-A markets shut, agency execution was the only avenue for securitization available. In order to fully understand this, it is important to take a step back and look at GSE pricing.

Fannie Mae and Freddie Mac have a rate, negotiated with each originator, at which they guarantee prime mortgages. This originator-specific guarantee fee is in the range of 16 to 18 basis points, and is for all mortgages that meet "prime" standards. For mortgages not qualifying for "prime" designation, the GSEs use risk-based pricing. For example, Fannie Mae has three levels of risk-based pricing—Expanded Approval Levels 1–3 (EA1, EA2, EA3). It is important to realize that in early 2007, neither Fannie Mae nor Freddie Mac changed their criteria as to which loans would qualify for agency execution, but they both automated the process of getting a risk-based priced loan approved. By mid-2007, mortgage loans whose risk warranted EA3 execution would pay approximately 125 basis points over prime execution. This was increased still further late in the year. In addition, any mortgage over 80% LTV requires PMI. Fannie Mae and Freddie Mac, by charter, cannot take the first loss on a mortgage with an LTV in excess of 80%. The PMI companies have also been raising their rates. More-

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over, depending on the risk level of the mortgage, Fannie and Freddie often require that PMI reduce LTV to 75%, or even 70%.

In 2006, a lender could offer a conforming sized subprime borrower several types of mortgages—a 7.5% mortgage, with the rate fixed for the first two years, and resetting to [LIBOR + a 600 margin] thereafter; or a 9.0% fixed-rate agency mortgage. The 7.5% mortgage resulted in much lower payments and were far more appealing to the borrower. In addition, in the subprime market, a borrower could take out a 99% LTV mortgage, which mortgage insurers charged dearly for. Thus, during the 2004–2006 period mortgages that could go agency or nonagency execution were executed through nonagency channels. During the course of 2007, it became very difficult to sell a subprime or Alt-A deal to investors. This fed back to the primary market, where originators were reluctant to extend mortgages that could not be securitized, and that they were unwilling to hold on balance sheet. Thus, there was only one channel of execution for subprime and Alt-A mortgages: agency execution. And this channel was not open to all borrowers in these markets. Subprime and Alt-A mortgages that did not qualify for agency execution were just not getting done.

Exhibit 1.10 shows the increased presence of loans with less than pristine credit in agency pools. Note that for 2006, 10% of the mortgages in fixed rate amortizing pools have LTVs greater than 80%, for September 2007 that proportion dropped to 26%. And interest-only mortgage pools with less than pristine credit have become even more common. In 2006, 3% of the 10/20s had LTVs that exceeded 80%, by September 2007 that was up to 27%. While there is much month-to-month variation, it is clear that the GSEs are guaranteeing more loans with less than pristine credit.

Looked at from the other angle, we estimate that approximately 68% of conforming Alt-A borrowers and 33% of conforming subprime borrowers would qualify for a mortgage from Fannie Mae or Freddie Mac. However, agency execution is not available, so does nothing for the 50% of Alt-A balances or 20% of subprime mortgages that are too large to qualify for a GSE guarantee. It also does nothing for the conforming-sized loans that cannot qualify for an agency mortgage.

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SUMMARY

In this chapter, we discussed the characteristics of three major types of nonagency MBS: jumbo, Alt-A, and subprime. We have shown that jumbo prime mortgages are loans of very high quality that are above the GSE loan limit of $417,000. Alt-A loans tend to have limited documentation plus at least one other risk factor. Subprime mortgages are usually extended to low-

EXHIBIT 1.10 High LTV/Low FICO (% of issuance)

	Fixed 30	Fixed IO (10/20)	5/1 Hybrid	All Hybrid	Fixed 30	Fixed IO (10/20)	5/1 Hybrid	All Hybrid
	%LTV > 80				%LTV > 90			
2003	5%	0%	2%	2%	1%	0%	1%	1%
2004	9%	1%	5%	4%	2%	0%	2%	1%
2005	8%	2%	4%	4%	2%	0%	1%	1%
2006	10%	3%	2%	5%	2%	0%	0%	0%
Jan-07	9%	3%	2%	13%	2%	1%	0%	2%
Feb-07	9%	4%	1%	7%	3%	1%	0%	3%
Mar-07	9%	7%	3%	5%	3%	1%	0%	1%
Apr-07	13%	10%	2%	5%	4%	2%	0%	0%
May-07	16%	25%	2%	5%	4%	4%	0%	3%
Jun-07	21%	30%	8%	10%	6%	4%	5%	6%
Jul-07	21%	36%	11%	8%	6%	7%	8%	6%
Aug-07	22%	27%	6%	5%	7%	9%	5%	3%
Sep-07	26%	27%	14%	15%	5%	6%	7%	9%
	%FICO < 700 & LTV > 80				%FICO < 700 & LTV > 90			
2003	3%	0%	1%	1%	1%	0%	1%	0%
2004	7%	0%	3%	2%	2%	0%	2%	1%
2005	5%	1%	1%	1%	1%	0%	1%	1%
2006	5%	1%	1%	1%	1%	0%	0%	0%
Jan-07	5%	1%	0%	0%	2%	0%	0%	0%
Feb-07	5%	2%	0%	0%	2%	1%	0%	0%
Mar-07	5%	3%	1%	2%	2%	1%	0%	0%
Apr-07	7%	2%	0%	0%	3%	2%	0%	0%
May-07	10%	5%	0%	1%	3%	4%	0%	0%
Jun-07	14%	9%	3%	3%	5%	3%	2%	1%
Jul-07	14%	8%	5%	4%	5%	5%	5%	3%
Aug-07	14%	9%	4%	2%	5%	6%	3%	2%
Sep-07	13%	5%	5%	3%	3%	4%	4%	2%

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EXHIBIT 1.10 (Continued)

	Fixed 30	Fixed IO (10/20)	5/1 Hybrid	All Hybrid	Fixed 30	Fixed IO (10/20)	5/1 Hybrid	All Hybrid
	%FICO < 700				%FICO < 660			
2003	10%	2%	3%	3%	2%	0%	0%	0%
2004	15%	9%	6%	5%	3%	0%	1%	1%
2005	12%	5%	4%	4%	3%	0%	1%	1%
2006	12%	8%	4%	3%	2%	1%	0%	0%
Jan-07	13%	10%	9%	7%	2%	0%	0%	0%
Feb-07	11%	6%	7%	7%	2%	0%	0%	0%
Mar-07	12%	7%	12%	12%	2%	0%	0%	0%
Apr-07	15%	6%	5%	5%	3%	1%	0%	0%
May-07	15%	9%	9%	9%	4%	1%	1%	1%
Jun-07	17%	10%	9%	9%	5%	0%	1%	1%
Jul-07	20%	11%	13%	11%	4%	0%	2%	2%
Aug-07	18%	11%	9%	6%	5%	1%	1%	1%
Sep-07	17%	6%	10%	7%	5%	0%	1%	0%
	%FICO < 660 & LTV > 80				%FICO < 660 & LTV > 90			
2003	1%	0%	0%	0%	0%	0%	0%	0%
2004	2%	0%	1%	1%	0%	0%	1%	0%
2005	1%	0%	0%	0%	0%	0%	0%	0%
2006	1%	0%	0%	0%	0%	0%	0%	0%
Jan-07	1%	0%	0%	0%	0%	0%	0%	0%
Feb-07	1%	0%	0%	0%	0%	0%	0%	0%
Mar-07	2%	0%	0%	0%	1%	0%	0%	0%
Apr-07	2%	0%	0%	0%	1%	0%	0%	0%
May-07	3%	0%	0%	0%	1%	0%	0%	0%
Jun-07	4%	0%	0%	0%	1%	0%	0%	0%
Jul-07	3%	0%	1%	0%	1%	0%	1%	0%
Aug-07	4%	1%	0%	0%	1%	0%	0%	0%
Sep-07	4%	0%	1%	0%	1%	0%	0%	0%

Source: Fannie Mae and Freddie Mac.

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er quality borrowers, and often contain other risk factors. In this chapter, we also examine the factors that determine default and prepayment risk: CLTV, FICO scores, documentation, loan size, loan purpose, debt-to-income ratio, adjustable rate mortgages, interest-only, and 40-year mortgages.

We took this one step further and outlined the origins of the subprime crises, making it clear that during the 2004–2006 period, as housing became less affordable, origination standards were stretched. The stretching of affordability product occurred in Alt-A and jumbo loans as well as in subprime. The stretch in affordability standards would have been fine if home prices had continued to appreciate. But with home price appreciation turning to home price depreciation, defaults, and delinquencies rose across the board.

In the next chapter we discuss the relationship between risk characteristics and losses and delinquencies. We show that risk layering coupled with a weak housing market produces high delinquencies and defaults.

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