

## The Subprime Mortgage Meltdown: Quantifying the Causes

Many suggest 2006 to 2008 home price depreciation was the primary driver of poor subprime mortgage performance. To be sure housing values were a major determinate but poor corporate credit policies were also pervasive. Although bad credit choices and market depreciation are not mutually exclusive, nor are they the only contributing factors (unemployment, interest rates, etc.), let's assume the two factors were dominant and credit was a controllable issuer event and depreciation was strictly market driven. That said let's strive to answer the following questions: Was there historical evidence prior to 2003 to 2007 expanded mortgage credit era that suggested wider origination guidelines would result in significantly higher loss rates? How much of subprime mortgage market deterioration can be attributed to lower home prices and how much can be contributed to poor credit practices?

The following is a summary of subprime security loans issued in each year from 1997 to 2007 per the Loan Performance securities database: (Loan Performance and OHFEO data)

<b>Subprime Loan Characteristics</b>											
<b>1997-2007</b>											
	<b>Origination Year</b>										
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
<b>Combined Loan to Value Ratio</b>	77.8%	77.5%	77.7%	78.0%	78.9%	80.4%	81.6%	81.1%	80.3%	81.6%	81.4%
<b>Debt to Income Ratio</b>	32.4%	34.9%	37.1%	38.3%	39.0%	39.2%	38.8%	40.0%	40.8%	41.5%	42.3%
<b>FICO Score</b>	611	603	597	588	597	615	627	621	623	630	626
<b>Reduced Documentation</b>	21.0%	26.0%	25.0%	26.0%	29.0%	30.0%	34.0%	36.0%	38.0%	43.0%	40.0%
<b>Investor and Second Home</b>	5.0%	6.0%	6.0%	5.0%	6.0%	5.0%	7.0%	6.0%	6.0%	6.0%	6.0%
<b>Purchase Money Loans</b>	24.0%	26.0%	27.0%	34.0%	28.0%	28.0%	27.0%	33.0%	36.0%	42.0%	30.0%
<b>&gt;95% CLTV</b>	6.6%	7.6%	7.3%	7.7%	6.9%	6.3%	8.9%	9.2%	9.1%	11.9%	9.5%
<b>&gt;50% Debt to Income Ratio</b>	1.9%	2.3%	3.7%	5.6%	5.4%	5.0%	5.0%	6.0%	6.5%	8.7%	9.2%
<b>Home Price Appreciation</b>	3.7%	6.0%	6.6%	6.5%	6.7%	7.6%	7.8%	9.2%	9.3%	2.9%	-2.6%

By 2006 underwriting standards had been compromised in terms of equity ownership (CLTV), payment ability (DTI), documentation standards, and new home buyers (purchase money loans) (see Subprime Loan Characteristics Table). Credit scores (FICOs) had improved slightly over that time and investor home originations, contrary to popular belief were only marginally higher. Unfortunately slightly higher FICO scores offered little loss protection as other collateral, credit, and capacity (3C's) characteristics were compromised. Two thousand and three was a \$4 trillion dollar mortgage production year driven by high refinance activity so in 2004-2007 many originators sought to increase volumes that would drive production and profitability back to those 2003 levels. Unfortunately credit guidelines were "widened" each successive year until 2007.

In the seven years prior to 2003 home price appreciation was moderate mitigating higher credit losses associated with "flat" or depreciating markets. Only using empirical evidence from 2000 the worst loss

year within 1997-2003 to determine the loss implications of relaxing guidelines what “known” losses were sure to surface?

The following table estimates the increased credit exposure from historical “known” risks associated with wider credit tolerances and the “unknown” risks related to residential market value depreciation that occurred in the 2006-2008 years.

<b>Subprime Mortgage Risk - Credit (Known) and Market (Unknown) Contribution</b>			
<b>Default Factors (Baseline = 12% Lifetime Defaults)</b>			
<b>Highest Estimate of Wider Credit Guidelines (2000 - Worst Performance Year)</b>			
	<b>Known Credit Value Decline</b>	<b>Unknown Market Value Decline</b>	<b>Risk Known and Unknown</b>
<b>Credit Default Characteristic</b>			
<b>Estimate of Market Value Decline Contribution</b>		1.75	
<b>Overall Combined LTV &gt;~5%</b>	1.22		
<b>Overall DTI &gt;~4%</b>	1.10		
<b>FICO &gt; 15 points</b>	0.90		
<b>Investor Properties &gt; ~3%</b>	1.02		
<b>Reduced Doc</b>	1.09		
<b>Product of Default Characteristic Factors (a)</b>	1.34	1.75	2.34
<b>Loss Severity (b)</b>	45%	55%	
<b>Cumulative Loss Contribution (a * b)</b>	0.60	0.96	
<b>Known (Credit) and Unknown (Market) Contribution</b>	39%	61%	
<b>Estimated Cumulative Losses (12% Baseline Defaults)</b>	7.238%	11.540%	18.778%

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Credit characteristics that were considered for the analysis were Combined Loan to Value Ratios (CLTV), Debt to Income Ratios (DTI), credit scores (FICO), and loan documentation. The default factors are multiplicative with factors over 1.0 increasing credit risks and factors under 1.0 decreasing default risk. The metric evaluated was 90+ days delinquent loans (as of month 24) as the roll rates to default are highly correlated in all economic environments.

Using historical data for the seven years 1997-2003 the combined effect of credit factors would have increased mortgage defaults by a 1.34X factor. With the exception of higher FICO scores the remaining characteristics increased the probability of default. Increases in CLTV, reduced documentation, and DTI characteristics were the largest detractors to performance. From 1997-2007, total (known and unknown) default frequency increased by 2.34X. For our purposes, market depreciation accounts for 100% of the

<sup>1</sup> The evaluation compared 90+ delinquency trends at month 24 over historical periods 1997-2003 (known credit performance prior to industry credit relaxation), 2004-2007 (expanded credit era), and 2006-2008 (home price depreciation) to estimate the effects of overall and individual credit characteristics and home prices. 90+ delinquency “roll rates” are very highly correlated to default and serve as an early indicator of ultimate performance.

unknown default risk or 1.75X determined by dividing the total default increase by known credit factors (2.34/1.34). The table of above shows all vintage year performance in 2006-2008; 2006-2007 vintage years will have considerably higher cumulative losses.

Loan severity was included to determine cumulative losses for known (45%) and unknown (55%) mortgage determinants (the increase in severity only added to the unknown credit component). Known or future subprime losses that could have been avoided by issuers were estimated to be 39% and market, or unknown (or uncontrollable) events were 61%.

39% doesn't sound that bad right? Wrong. First, this analysis assumes that issuers should not have considered a fall in home prices in making credit decisions and that easier credit was not a factor in artificially elevating real estate values, assumptions that are way too forgiving. Second, 39% of subprime losses incurred would have eroded the first loss or residual values and many other lower rated bond classes in most issuer securitizations effectively eliminating all production profits. Last, issuer actions did more than just lower corporate profits as the growth in the mortgage securitization magnified loss exposure as risks were financially leveraged in the form of Collateralized Debt Obligations (and CDO ^2) and Credit Default Swaps.

Does this all mean we should have never originated these mortgages? This article as many others are after the fact and of course hindsight is 20-20. What I would say is that we were not getting paid enough for quantifiable risks. If that would have resulted in borrowers not paying the higher mortgage rates required hence the loans would not have been made, so be it. If borrowers paid the higher interest rates, put more money down, or provided more documentation to lower their rate, so be it. We will never know.

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