

Understanding the Financial Crisis: A Look Back

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1 **I. Introduction**

2 By the end of 2008, declining home values, consumer credit restrictions, commercial lending
3 freezes, and the need for additional capital had contributed to a perfect storm of home
4 foreclosures and weakened and collapsing financial institutions. What happened?

5 This financial crisis has many causes. In a larger sense, the financial crisis combines a liquidity
6 crisis involving a short supply of cash to lend; a credit crisis involving a reduction in the general
7 availability of loans; and a recession where a significant decline in economic activity lasting
8 more than a few months has spread across the economy – a decline reflected in real GDP, real
9 income, employment, industrial production, and wholesale-retail sales. We do not seek to explain
10 all of the above. Instead we focus on three interrelated, important factors: (1) changes in
11 consumer behavior favoring subprime mortgage products, (2) increased mortgage securitization,
12 and (3) changes in the composition of banks’ balance sheets.

13
14 In the sections that follow, we will illustrate that in leading up to the financial crisis (1) changes
15 in legislation, interest rates, and housing prices led to a dramatic increase in consumer demand
16 for subprime mortgages; (2) the entry of government-sponsored-enterprises (GSEs) (for
17 example, Fannie Mae) into the subprime market and the rise of private label securitization
18 increased the supply of subprime mortgages; and (3) a change in the composition of the banks’
19 balance sheets, resulting in higher levels of mortgage-backed securities (MBSs), collateral debt
20 obligations (CDOs), and asset-backed securities (ABSs), coupled with relatively small
21 percentages of equity and the presence of large amounts of rollover debt (repos), led to the
22 banks’ inability to deal with a decline in the value of subprime products.

23 **II. What is subprime mortgage lending?**

24 During the subprime lending boom of the past 10 years, no standard definition of subprime
25 lending existed. People defined subprime lending in at least three ways, each of which has
26 advantages and drawbacks.²

27 First, we can define subprime lending by focusing on the borrower. A subprime borrower has
28 one or more of the following characteristics:

- 29 • Low FICO score (typically defined as below 620);³
 - 30 • Mortgage payment delinquency;
 - 31 • Recent bankruptcy filing;
 - 32 • Home foreclosure; or
 - 33 • High ratio of debt-to-income (DTI).
- 34

² Christopher L. Foote, Kristopher Gerardi, Lorenz Goette, and Paul S. Willen, “Just the facts: An initial analysis of subprime’s role in the housing crisis,” *Journal of Housing Economics* 17 (2008) 291-305, 295. In addition, some use a fourth definition: they define a loan as subprime if the interest rate is high. That definition, however, assumes the answer and does not focus on the reason for the interest rate, which we discuss below.

³ FICO scores range between 300 and 850, and a borrower with a FICO score of 620 or lower usually falls in the subprime category. C. L. Foote, et al., “Just the facts,” 291-305, n. 12.

35 Many borrowers, however, who did not fit this profile still participated in the subprime market,
36 either because they could get subprime loans without providing complete income or personal
37 documentation or because they desired to take advantage of subprime's nontraditional loan
38 terms.

39 Foote, Gerardi, Goette, and Willen (2008) analyzed subprime's role in the housing crisis and
40 noted that the FICO scores of subprime borrowers increased during the 1999-2004 period. Their
41 data also demonstrated, however, that subprime borrowers with high FICO scores also had high
42 loan-to-value (LTV) ratios, high DTI ratios, or incomplete documentation of income and assets.⁴
43 As a result, these borrowers could not have obtained a prime loan despite their higher FICO
44 scores.

45 Second, we can define subprime lending by focusing on the lender. The Department of Housing
46 and Urban Development (HUD) maintains a list of firms it identifies as subprime lenders based
47 on the characteristics of the lenders' business models.⁵ For example, if a lender focuses on
48 refinancing existing home loans or if a lender does not sell a significant portion of its loan
49 inventory to Fannie Mae and Freddie Mac,⁶ HUD will classify that firm as a subprime lender.⁷
50 Yet firms on this list also make prime (or standard) loans, and lenders not on this list make
51 subprime loans. Counting all loans made by firms on the HUD's subprime list may overstate or
52 understate the total number of subprime loans.

53 Third, we can define subprime lending by focusing on how the market describes the loan. For
54 example, if a bank packaged the loan into an MBS described as subprime, one would define that
55 loan as subprime.⁸ Nevertheless, not every loan packaged into a subprime mortgage-backed
56 security may fit either of the two previous definitions. Market participants also may refer to
57 subprime lending as "B&C Lending" (i.e., "B" and "C" quality loans as opposed to "A" quality
58 loans).⁹

59 Because no single definition appears clearly superior to the others, we will use all of them. In
60 addition, we will also include Alt-A (short for Alternative A-paper) loans as subprime products.
61 Alt-A borrowers typically have higher credit scores than other subprime borrowers, but the Alt-A
62 loans have more risk than prime loans because of smaller down payments, reduced income
63 documentation, or nontraditional loan terms.¹⁰

⁴ C. L. Foote, et al., "Just the facts," 291-305, 292, 301-304.

⁵ Souphala Chomsisengphet and Anthony Pennington-Cross, "The Evolution of the Subprime Mortgage Market," *Federal Reserve Bank of St. Louis Review*, Jan./Feb. 2006, 41, n. 8.

⁶ Traditional or prime mortgages are sometimes known as "conforming" mortgages as they conform to the standards of the Government Sponsored Enterprises (GSEs) Fannie Mae and Freddie Mac, and are guaranteed by them. Richard K. Green, "Imperfect information and the housing finance crisis: A descriptive overview," *Journal of Housing Economics* 17, (2008), 262-271, 263.

⁷ C. L. Foote, et al., "Just the facts," 291-305, n. 16.

⁸ C. L. Foote, et al., "Just the facts," 291-305, 295.

⁹ See Countrywide B&C lending rate sheet in S. Chomsisengphet, et al., "Evolution of the Subprime Mortgage Market," 34.

¹⁰ Truth in Lending Act Amendment Z, Federal Register, Vol. 73, No. 147, July 30, 2008, 44524.

64 In some cases the classification of riskier loans will include Jumbo loans. Jumbo loans meet
65 prime loan requirements except for their size, which exceeds the mortgage amount Fannie Mae
66 and Freddie Mac can purchase.¹¹

67 According to Chomsisengphet and Pennington-Cross (2006), lenders use different bases when
68 calculating the applicable interest rate for prime versus subprime loans. Lenders ascertain the
69 interest rate for a subprime loan based on the borrower's credit history and the size of the down
70 payment. For a prime loan, lenders ascertain the interest rate based on the size of the down
71 payment alone, because the borrower has already satisfied minimum credit history requirements.
72 Interest rates for subprime loans exceed those for prime loans. During the period from 1995 to
73 2004, subprime mortgage rates on 30-year fixed-rate loans averaged about two percentage points
74 higher than prime market rates.¹²

75 Lenders typically have several loan grades within their category of "subprime loans." For
76 example, in 2005, Countrywide Home Loans, Inc. had six loan grades in its "B&C Lending
77 Sheet": Premier Plus, Premier, A-, B, C, and C-. The grade for which a borrower qualified at
78 Countrywide depended on the borrower's mortgage/rent payment history, foreclosures,
79 bankruptcies, and debt-to-income ratio. Within each grade, moreover, the interest rate paid by
80 the borrower varied depending on his/her credit score and LTV ratio.¹³

81 **III. The rise of consumer demand for home loans**

82 Demand for home loans increased significantly as new laws enabled banks to charge high rates
83 and fees to consumers, allowing consumers access to mortgages with nontraditional terms, and
84 creating tax incentives for home-related borrowing. Low interest rates and a struggling stock
85 market also led to increased investment in real estate.

86 *A. Changes in legislation*

87 The deregulation of banks that took place in the early 1980s enhanced their ability to engage in
88 subprime lending. Some examples include:

89 In 1980, Congress passed the Depository Institutions Deregulation and Monetary Control Act
90 (DIDMCA), which eliminated state mortgage usury ceilings and removed any restrictions on
91 rates charged by lenders for residential mortgage loans.¹⁴ The removal of rate restrictions made
92 lending to borrowers with imperfect credit more feasible.

93 In 1982, Congress passed the Alternative Mortgage Transaction Parity Act (AMTPA).¹⁵ Banks
94 used the opportunity created by the AMTPA to develop the following options:

¹¹ C. L. Foote, et al., "Just the facts," 291-305, n. 11.

¹² S. Chomsisengphet, et al., "Evolution of the Subprime Mortgage Market," 31, 33-34.

¹³ S. Chomsisengphet, et al., "Evolution of the Subprime Mortgage Market," 34-35.

¹⁴ S. Chomsisengphet, et al., "Evolution of the Subprime Mortgage Market," 38; Brenda White, "A Short History of Subprime," *Mortgage Banking*, March 1, 2006, 17.

¹⁵ S. Chomsisengphet, et al., "Evolution of the Subprime Mortgage Market," 38.

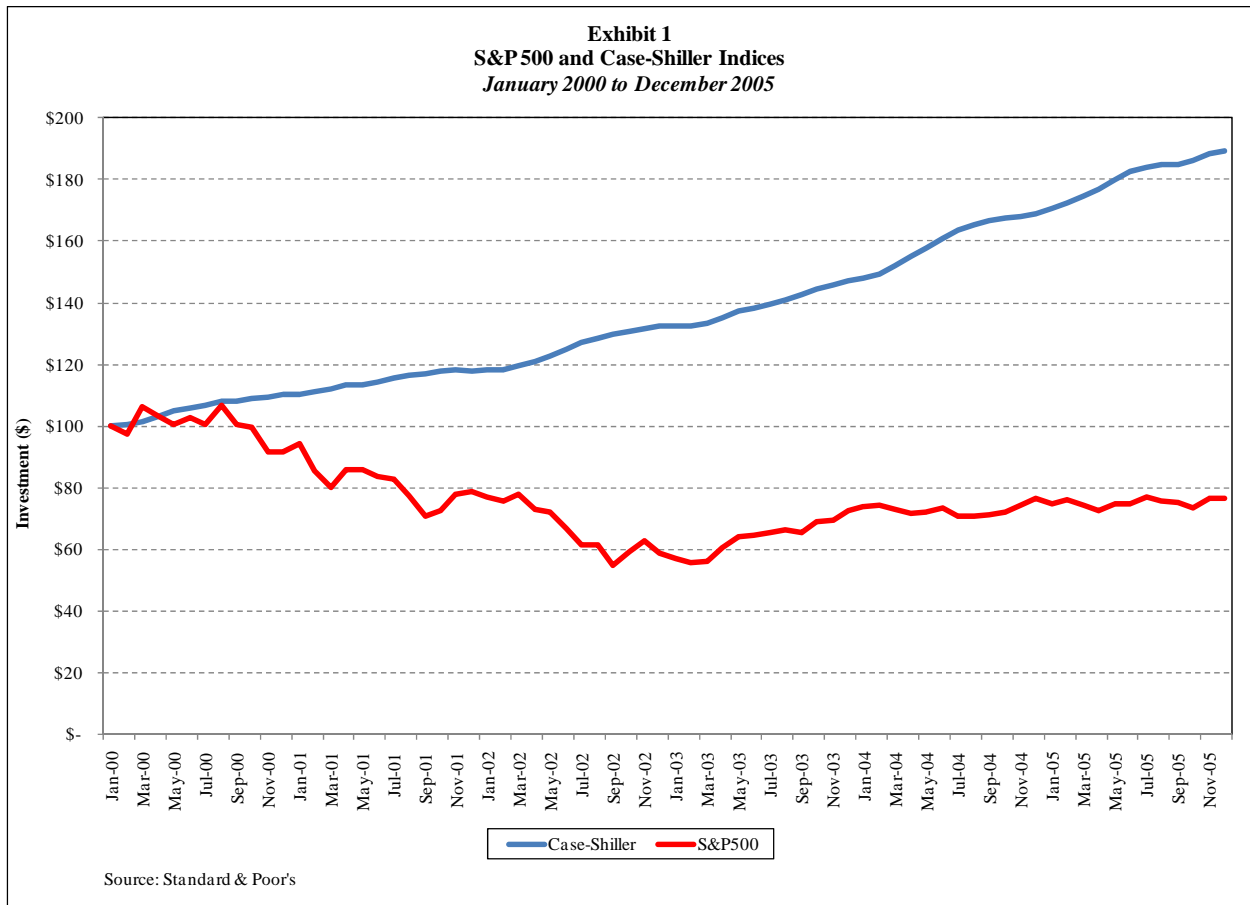
- 95 • Adjustable-rate mortgages (ARMs): The rate floats after a few years of being fixed. A
96 typical adjustable-rate mortgage is a “2/28,” which means the interest rate is fixed for
97 the first two years and floats for the remaining 28 years.
- 98 • Balloon-payment mortgages: Borrowers must make an outsized payment when the
99 loan comes due, typically at a relatively short maturity such as five or seven years.
- 100 • Interest-only mortgages: For the first few years, borrowers only repay interest, and
101 then the monthly payment resets to include the principal and interest.
- 102 • Option-ARM: This is an adjustable rate mortgage where the interest rate is tied to an
103 index and where there may also be a payment cap on monthly payments. In periods
104 when the interest rate is high enough, interest and principal payments for that month
105 exceed the payment cap. In that case the borrower pays the amount of the payment
106 cap, and the bank adds the difference between the payment cap and the amount owed
107 for interest to the mortgage balance. The situation where the mortgage increases
108 because the borrower pays a payment cap, instead of an amount at least equal to the
109 interest, is known as *negative amortization*.
- 110 Further, the Tax Reform Act of 1986 increased the demand for mortgage debt because it
111 prohibited interest deductions on consumer and automobile loans, while allowing them on
112 mortgages for a primary residence and one additional home.¹⁶ Combined with the changes in
113 lending laws, this legislation set the stage for the enormous growth in subprime lending.

¹⁶ S. Chomsisengphet, et al., “Evolution of the Subprime Mortgage Market,” 38; B. White, “A Short History,” 17.

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B. Performance of the housing market relative to alternative investments

115 The performance of dot-com stocks in the late 1990s led to a stock market crash in 2000. The
116 five-year period starting in April 2000 was one of the worst five-year performances of the S&P
117 500 in 50 years. Examining the value-weighted returns of the S&P 500 Index from January 1,
118 1960 and through December 31, 2008, we found that the -2.9% average annual return for the
119 period April 1, 2000 through April 1, 2005 was the third-worst 60-month performance for the
120 S&P 500 in nearly 50 years. Investors began looking elsewhere for returns and the increase in
121 home prices relative to everything else made housing an increasingly attractive investment
122 option. (See Exhibit 1.)

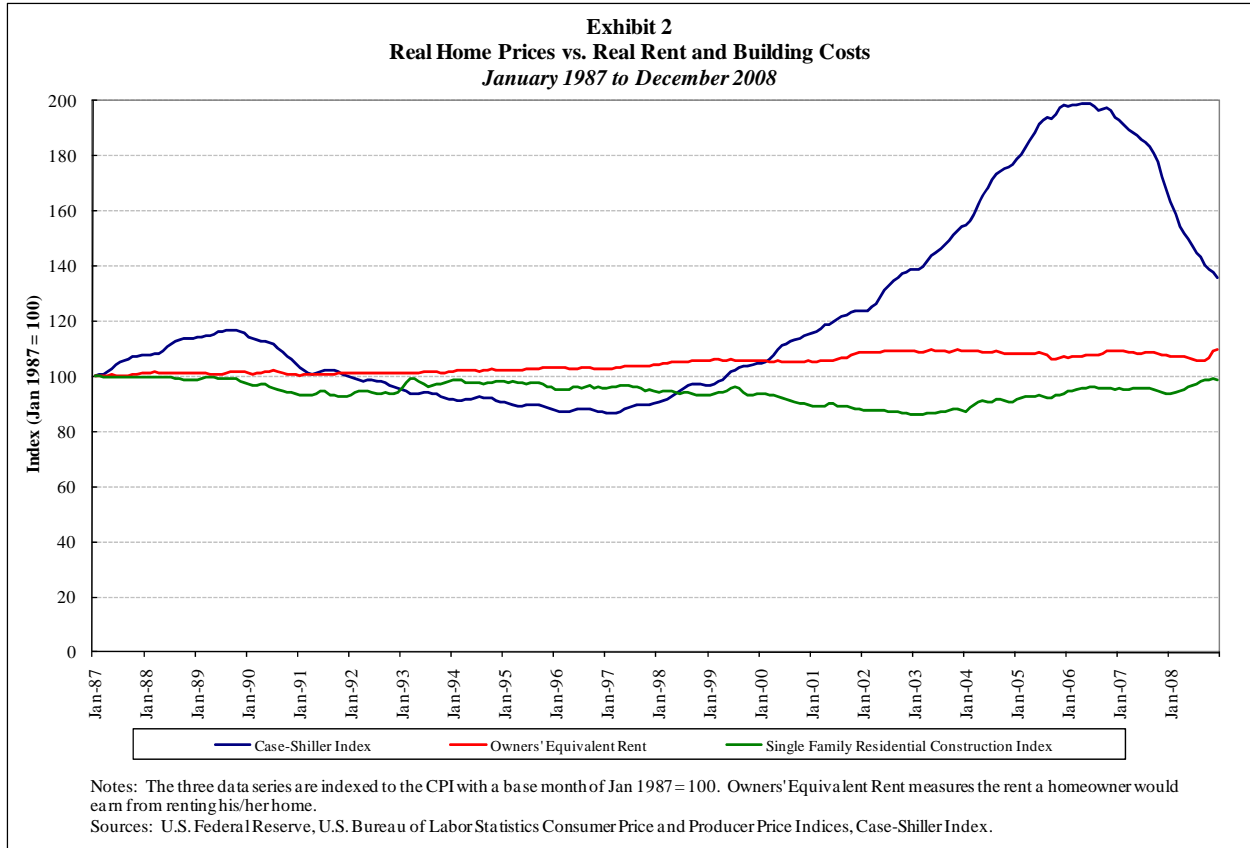


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125 From 1998 through 2005, the Housing Price Index (HPI) rose steadily, and the increase in real
126 home prices far outpaced the increase in real rents and real building costs. The S&P/Case-Shiller
127 Home Price Index showed a 120 percent increase in average U.S. home prices from the
128 beginning of 1998 to the beginning of 2006. (See Exhibit 2.)

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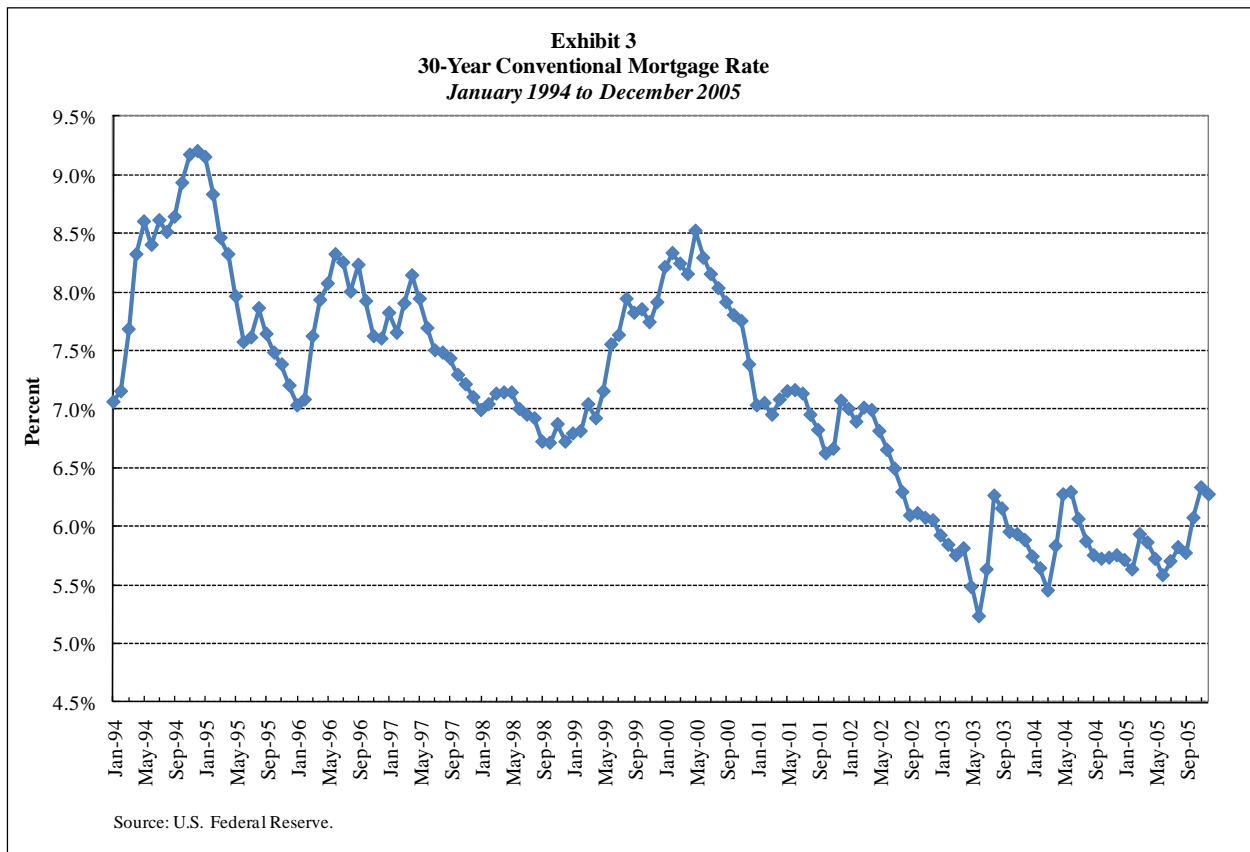
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136 During much of that same period, from 2000 to 2005, the cost of mortgage credit declined as
137 interest rates dropped to a 40-year low.¹⁷ (See Exhibit 3.)

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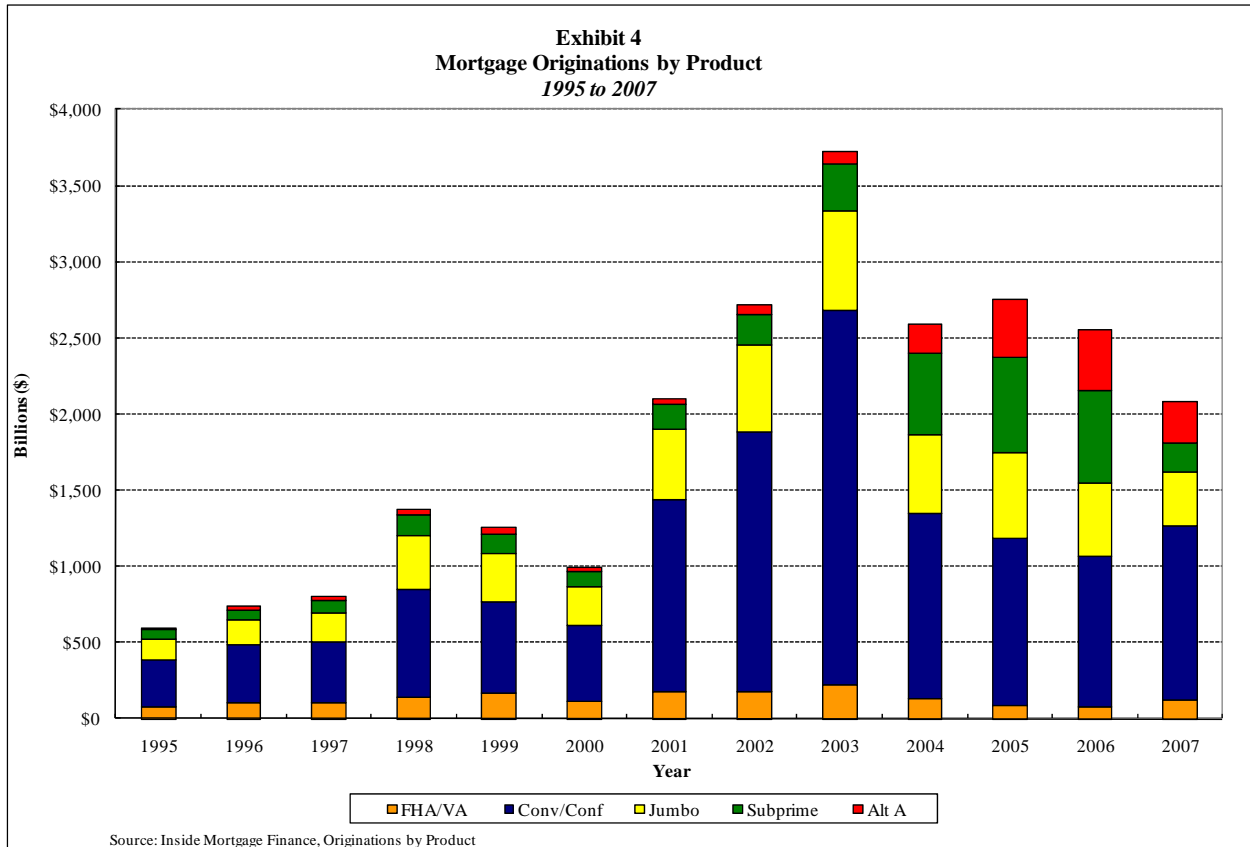
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¹⁷ S. Chomsisengphet, et al., "Evolution of the Subprime Mortgage Market," 41.

141 C. Growth in subprime mortgage lending

142 The effects of deregulation combined with the better performance of investments in the housing
143 market relative to investments in the stock market resulted in a boom in mortgage originations.
144 Total mortgage originations grew from \$639 billion in new loans in 1995 to \$3.76 trillion in
145 2003. (See Exhibit 4.)

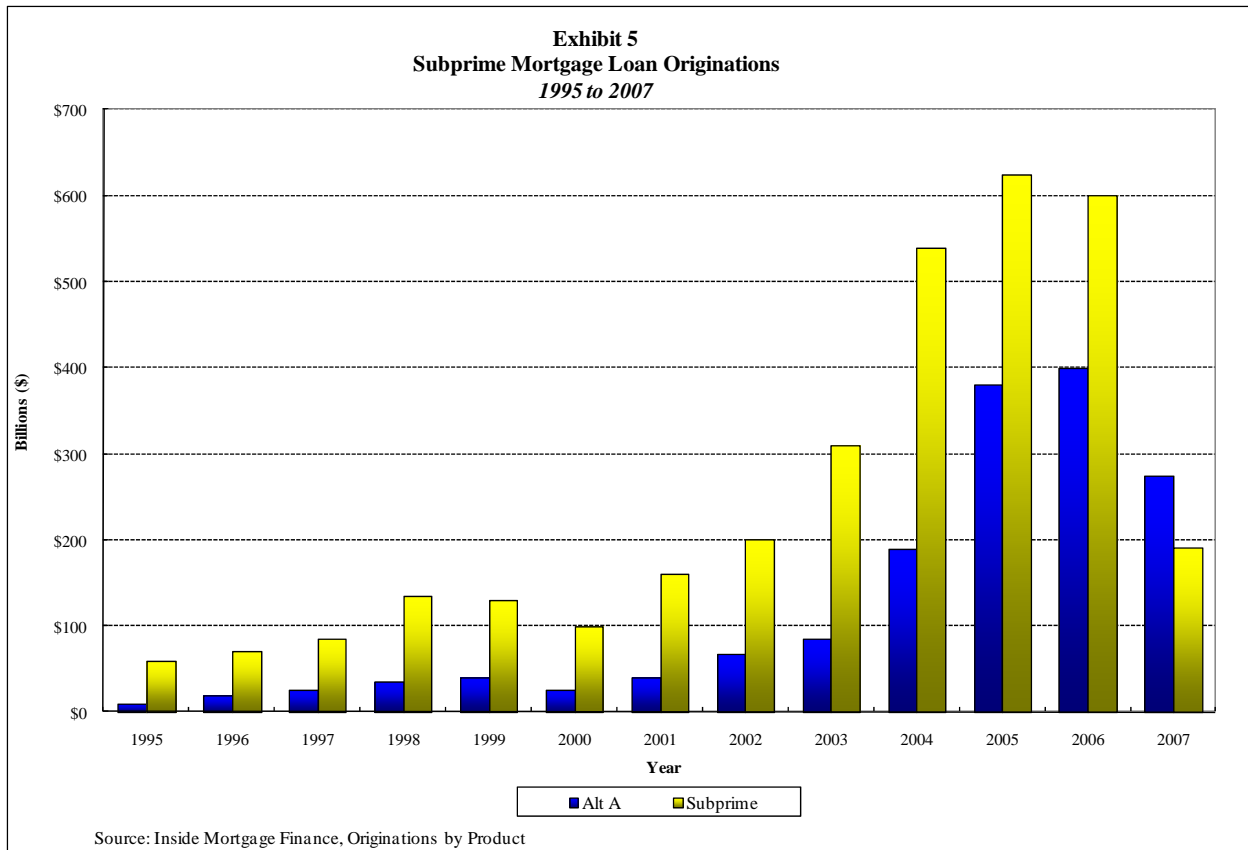
146 To put this in perspective, the combined 2003 GDP of Germany and Italy equaled \$3.88
147 trillion.¹⁸



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149 | Subprime mortgage lending grew by an even greater percentage and for a longer period of time
150 than conventional or prime mortgage lending. As shown in Exhibit 4, subprime and Alt-A
151 mortgage loan originations grew from less than \$100 billion in 1996 to nearly \$1 trillion in 2006,
152 an annual growth rate of more than 27 percent. By comparison, prime mortgages grew an
153 average of 8 percent annually during the same period.

¹⁸ International Monetary Fund, World Economic Outlook Database, September 2004.



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156 While conventional mortgage originations peaked in 2003, subprime mortgage lending
 157 (subprime and Alt-A combined) continued to grow through 2005, increasing from an average of
 158 12 percent of total originations in 1995 to 43 percent of all originations in 2005 and remaining
 159 relatively flat in 2006. After 2006, subprime mortgage originations began to decline rapidly as
 160 housing prices fell and defaults and foreclosures increased. (See Exhibit 5.)

161 *D. Resulting changes in consumer behavior*

162 The expansion of the mortgage market had important effects on three types of consumers: (1)
 163 borrowers converting their equity to cash, (2) borrowers investing in property, and (3) first-time
 164 homebuyers.

165 The first group of borrowers took advantage of the low and declining mortgage interest rates of
 166 the late 1990s and early 2000s, coupled with rising home prices and the tax-deductibility of
 167 interest, and converted their home equity into cash (often substituting consumer debt for housing
 168 debt), either in the form of “cash-out refinancing” or a “home equity line of credit.”

169 Cash-out refinancing allowed a homeowner who owed, for example, \$50,000 on a home valued
 170 at \$200,000, to take out a loan against the value of the home for an amount greater than \$50,000,
 171 to pay off the existing mortgage and consumer debt, and to pocket the remainder of the money.
 172 Freddie Mac analyzed the percentage of cash-out refinancing on a quarterly basis during this

173 period. In 2001 Freddie Mac estimated that around 55.25 percent of its refinances resulted in a
174 loan that was 5 percent or more higher than the original loan. By 2006 the percentage grew to
175 86.25.¹⁹

176 Home equity lines of credit (HELOC) enabled borrowers to avoid the lengthy, costly process of
177 mortgage origination. With a HELOC, borrowers also had the ability to borrow whenever they
178 wished. On the other hand, the interest rates associated with HELOCs usually floated in
179 accordance with some short-term measure (e.g., LIBOR, prime rate) and were higher than the
180 ARM interest rates. Because the borrower could deduct HELOC interest payments on his/her tax
181 return when the sum of the borrower's mortgage and HELOC totaled less than \$1.1 million, and
182 because interest rates on credit cards and auto loans rose, subprime borrowers tended to
183 refinance their homes.²⁰

184 The second group of borrowers bought additional homes. Sales of second homes amounted to
185 296,000 in 1995, but increased to 415,000 in 2000, and hit a peak in 2005 with sales of 3.34
186 million.²¹ Borrowers financed a large percentage of these home purchases using subprime loans
187 or cash from HELOC. For example, borrowers with 2-28 ARMs might use such a mortgage as a
188 type of option.²² If housing prices increased greatly during the first two years of the loan, the
189 borrower would sell and receive a high rate of return because of the low monthly payments. If
190 housing prices declined, the borrower could default at a lower cost than an investor with a
191 conventional mortgage.²³

192 The third group of borrowers used subprime loans to become first-time homeowners. According
193 to the 2005 American Housing Survey, a major shift between 2001 and 2005 occurred in the
194 numbers of first-time homeowners using cash and those not making a downpayment. The
195 number of first-time homeowners using cash for a downpayment decreased from 70.3 percent to
196 58.2 percent, while the number of first-time homeowners making no downpayment increased
197 from 11.8 percent to 23.7 percent.²⁴ During 2006, moreover, between 25 and 30 percent of all
198 subprime mortgage originations were for first-time homeowners. (See Exhibit 6.)

¹⁹ Freddie Mac, "Refinance Activity Remains High; Cash-Out Share Falls in Fourth Quarter." Press Release, February 6, 2007.

²⁰ Yuliya S. Demyanyk, "Quick Exits of Subprime Mortgages," *Federal Reserve Bank of St. Louis Review*, March/April 2009, 91(2), pp. 79-93, p. 81.

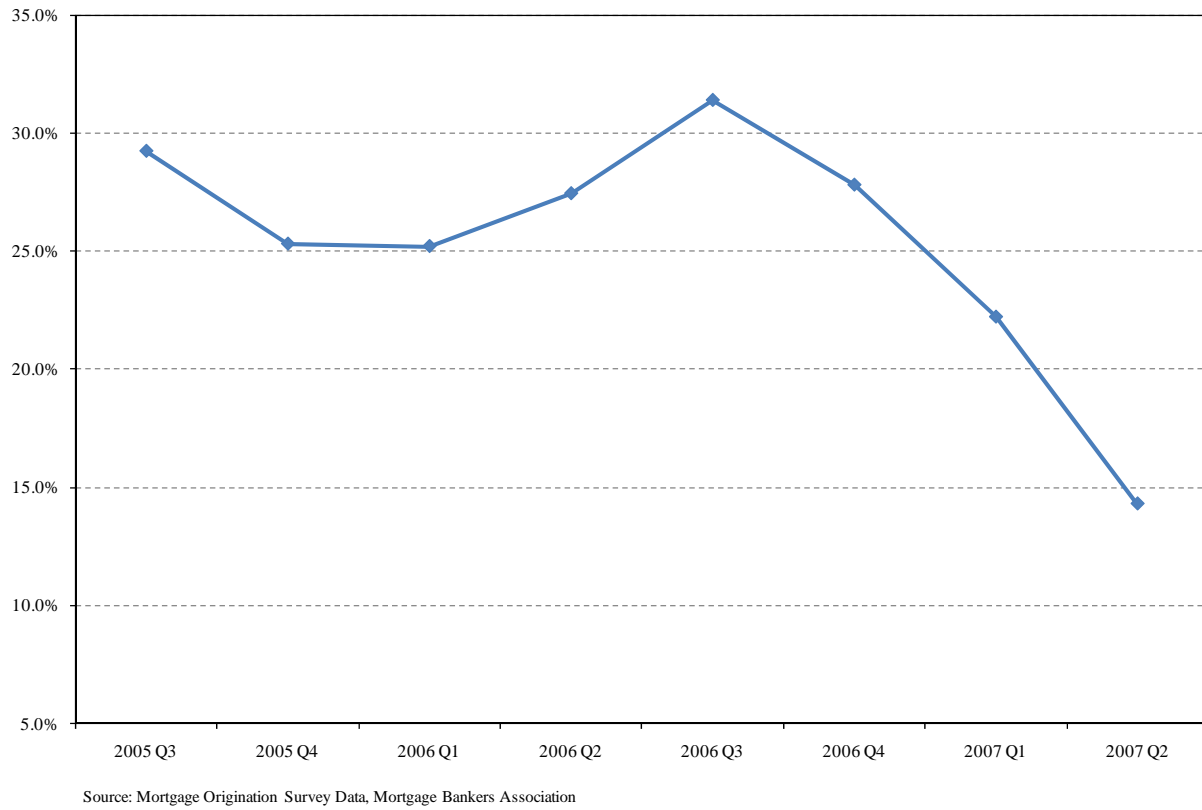
²¹ National Association of Realtors Survey.

²² A 2-28 ARM has a fixed lower interest rate for the first two years and 28 years of adjustable interest rates thereafter.

²³ Richard K. Green, "Imperfect information," 262-271, 266.

²⁴ U.S. Department of Housing and Urban Development, First-Time Homebuyers: Update from the 2005 American Housing Survey, p. 12-13,

Exhibit 6
First-Time Homebuyers as a Percentage of All Subprime Mortgage Purchases



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E. The decline of the housing market (2006 to 2008)

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After the peak of subprime mortgage originations in 2005-2006, housing prices began to decline and foreclosures and defaults began to increase at a rapid pace. During 2007 alone, the price of housing measured by the S&P/Case-Shiller Home Price series declined 10 percent (see Exhibit 7) and single-family housing starts declined by almost 42 percent.²⁵ By the end of 2007, failure rates on subprime mortgages had reached 20 percent.²⁶ During 2008 the price of housing continued declining rapidly (see Exhibit 7).

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In light of these various problems, subprime originations decreased from \$600 billion in 2006 to less than \$200 billion in 2007. (See Exhibit 5.) Between mid-2005 and September 2008, seriously delinquent subprime and Alt-A mortgages increased from 5.6 percent to over 23 percent and from 0.6 percent to 11 percent, respectively.²⁷

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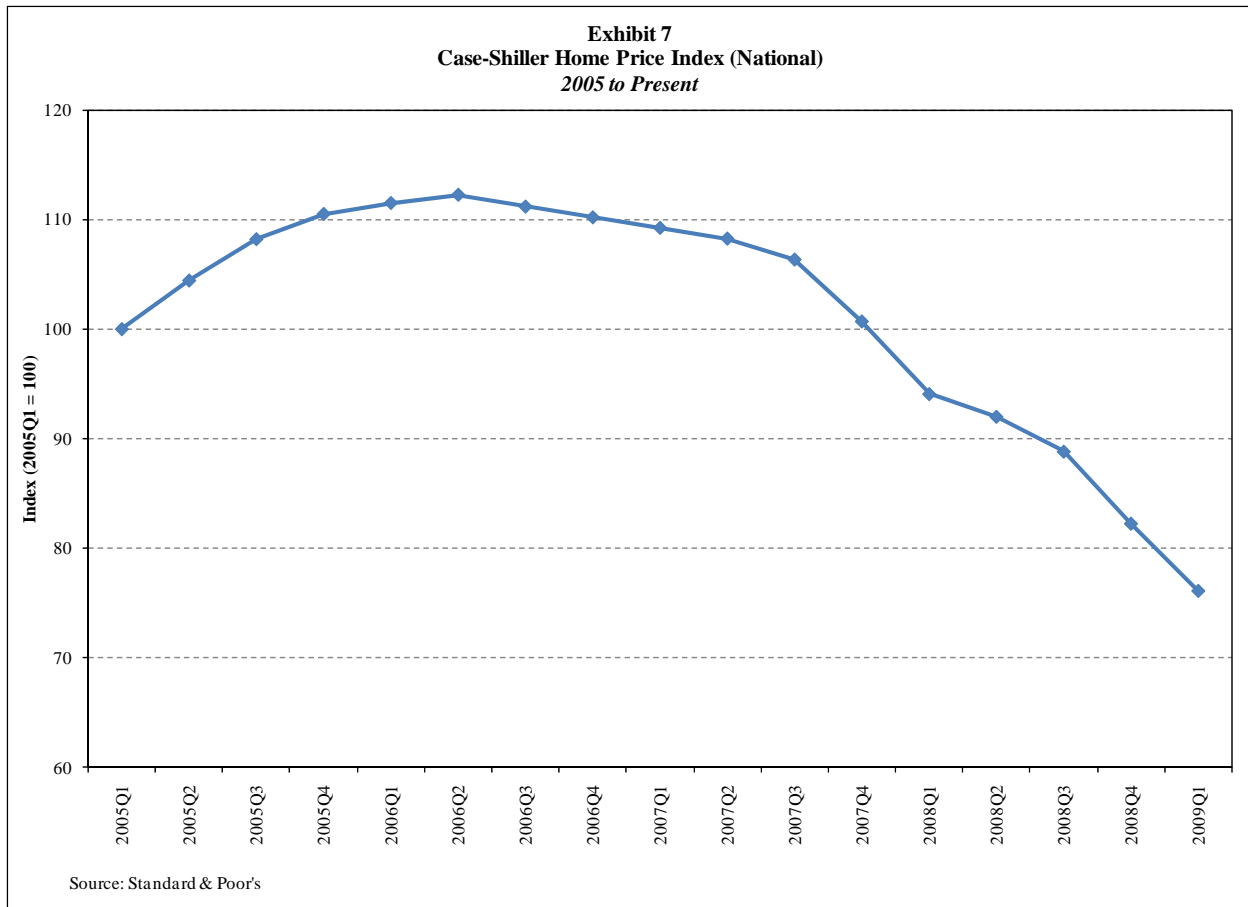
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²⁵ Stuart Gabriel, John M. Quigley, and Larry A. Rosenthal, “The Mortgage Meltdown, the Economy, and Public Policy,” *The B.E. Journal of Economic Analysis & Policy*: Vol. 9: Iss. 3 (Symposium), Article 1, 1.

²⁶ Stuart Gabriel, et. al, “The Mortgage Meltdown, 1.

²⁷ Christopher Mayer, Karen Pence, and Shane M. Sherlund, “The Rise in Mortgage Defaults,” *Journal of Economic Perspectives*, 23 (Winter 2009), 27-50, 28.



212

213 Researchers debate the implications of this decline, but the underlying data related to four
 214 alleged factors (declining housing prices, changed underwriting practices, unsophisticated
 215 borrowers, and first-time homebuyers) reveal interesting information along with unanswered
 216 questions.

217 *Declining housing prices*

218 Housing prices dramatically declined starting in spring 2006.²⁸ (See Exhibit 7.) Consider the
 219 following situation: A homeowner loses a job or has large medical expenses not covered by
 220 insurance. In times of rising housing prices, the homeowner can sell or use home equity
 221 refinancing to fund his/her expenses until the financial storm passes. But in times of falling
 222 housing prices, the homeowner may not have sufficient equity to refinance, and the value of the
 223 house may have dropped below the mortgage amount, causing the homeowner to default on the
 224 mortgage payments because of the homeowner's liquidity crisis brought about by job loss or
 225 medical expenses.

²⁸ Christopher Mayer, et. al., "The Rise in Mortgage Defaults," 27-50, 29; Janet Yellen, "The Mortgage Meltdown, Financial Markets, and the Economy," *The B.E. Journal of Economic Analysis & Policy*: Vol. 9: Iss. 3 (Symposium), Article 3, 3; C. L. Foote, et al., "Just the facts," 291-305, 305; Kristopher Gerardi, Andreas Lehnert, Shane M. Sherlund, and Paul Willen, "Making Sense of the Subprime Crisis," *Brookings Papers on Economic Activity*, Fall 2008, 141-142.

226 *Changed underwriting standards*

227 Did changed underwriting standards cause the increased number of subprime defaults? Mayer,
228 Pence, and Sherlund (2009) found that from January 2005 to June 2007, the median LTV ratio
229 for home purchases (rather than for refinancing) equaled 100 percent for subprime mortgages
230 and 95 percent for Alt-A mortgages.²⁹ Hence, in half the subprime originations occurring during
231 this period, the borrower did not make a down payment, had no equity in the home from the
232 start, and had less incentive to make payments when the value of the home fell. Any decline in
233 housing prices would place this group of borrowers in the position of having negative equity in
234 their homes. Further, Gerardi, Lehnert, Sherlund, and Willen (2008) found that the proportion of
235 new subprime loans originating with less than full documentation (more evidence of changed
236 underwriting standards) increased from 20 percent in 1999 to around 35 percent by mid-2006.³⁰
237 These statistics would suggest the existence of less strict underwriting standards.

238 Yet looser or less strict underwriting standards do not sufficiently explain the dramatic increase
239 in subprime defaults. The median LTV ratio for subprime loans originating in 2003 and 2004
240 already equaled 90 percent and 95 percent, respectively. While the LTV ratio for subprime loans
241 increased between 2003 and 2007, these ratios were already quite high compared to the LTV
242 ratios of prime loans. The LTV ratios for subprime loans originated during the period 2005 to
243 2007 did not differ significantly from earlier loans. As for incomplete documentation, those
244 loans increased only 15 percent between 1999 and 2006 and never represented the majority of
245 subprime originations.

246 *Unsophisticated borrowers*

247 Did subprime borrowers who had ARMs and could not afford the payments once the initial
248 “teaser” interest rates reset (that is, “unsophiscated borrowers”) cause the dramatic increase in
249 defaults? Foote, Gerardi, Goette, and Willen (2008) found data contradicting this theory. Their
250 analyses showed that:

- 251 • The typical subprime ARM never had a low teaser rate and generally paid three
252 percentage points more than the rates on a prime equivalent;
- 253 • The initial rates on subprime fixed-rate mortgages (FRMs) and subprime ARMs differed
254 by only about 14 basis points once one controlled for the borrower’s FICO score,
255 presence of second mortgage, documentation status, and LTV ratio; and
- 256 • Both subprime lenders and borrowers expected that most subprime borrowers would
257 refinance the mortgage about the time that the reset period began.³¹

258 For subprime ARMs originating in 2001, for example, only 22.3 percent remained active 27
259 months after origination (3 months after the reset period began). Borrowers refinanced 66.0
260 percent, and 11.7 percent of the remaining subprime ARMs were foreclosed or delinquent.³² On

²⁹ Christopher Mayer, et. al., “The Rise in Mortgage Defaults,” 27-50, 31.

³⁰ Kristopher Gerardi, Andres Lehnert, Shane M. Sherlund, and Paul Willen, “Making Sense of the Subprime Crisis,” *Brooking Papers on Economic Activity*, Fall 2008, 80.

³¹ C. L. Foote, et al., “Just the facts,” 291-305, 298-301.

³² C. L. Foote, et al., “Just the facts,” 291-305, 299. The data cited indicate that no homeowner simply paid off his/her subprime loan.

261 the other hand, Foote, Gerardi, Goette, and Willen’s research also showed that borrowers using
262 subprime ARMs defaulted more than borrowers using subprime FRMs when housing prices
263 declined.³³

264 Contrary to the “unsophisticated borrower” theory, the data suggest that “lower teaser rates”
265 generally did not exist, rates on ARMs and FRMs were similar for similar borrowers, and
266 borrowers and lenders shared similar expectations about refinancing.

267 *First-time homebuyers*

268 Did subprime lending to first-time homebuyers purchasing after 1999 cause the increased default
269 rates? This theory combines the arguments related to “changed underwriting standards” and
270 “unsophisticated borrowers” mentioned previously.

271 In their analysis of the Massachusetts home market, Foote, Gerardi, Goette, and Willen (2008)
272 found that borrowers purchased many of the homes subsequently lost to foreclosure before 1999
273 and that, of the foreclosures occurring in 2006-2007 involving subprime loans, borrowers
274 purchased only 30 percent of them originally with subprime loans.³⁴ Although the data do not
275 reveal whether borrowers used cash-out financing for the subsequent mortgages, Foote, Gerardi,
276 Goette, and Willen (2008) found evidence suggesting that the owners of homes with subprime
277 loans lost to foreclosure might have removed large amounts of the equity from their
278 investment.³⁵ In any event, the data do not support the theory that first-time homebuyers
279 purchasing a home after 1999 with subprime mortgages caused the increased mortgage default
280 rate.

281 *Conclusions*

282 Changed underwriting standards, unsophisticated borrowers with ARMs, and first-time
283 homebuyers purchasing after 1999 contributed in some way to the state of negative equity that
284 existed after the decline in housing prices. But without the falling housing prices, the subprime
285 loans would not have defaulted to the extent observed.

286 That said, why was the decline in housing prices in 2007 and 2008 a surprise to so many? We
287 have not found the definitive answer to that question. After reading “the mountain of research
288 reports, media commentary, and other written records left by market participants,”³⁶ Gerardi,
289 Lehnert, Sherlund, and Willen (2008) concluded that “at the start of 2005, it was genuinely
290 possible to be convinced that nominal U.S. home prices would not fall substantially.”³⁷ Analysts
291 understood the catastrophic potential of a massive decline in housing prices, but analysts also
292 assigned an extremely low probability to that event.³⁸ More specifically, while analysts predicted
293 that housing price growth would not continue at then-current levels and would revert to the long-

³³ C. L. Foote, et al., “Just the facts,” 291-305, 298-301.

³⁴ C. L. Foote, et al., “Just the facts,” 291-305, 292, 296, 303-304.

³⁵ C. L. Foote, et al., “Just the facts,” 291-305, 292, 296-297, 303-305.

³⁶ Kristopher Gerardi, et. al., “Making Sense,” 141.

³⁷ Kristopher Gerardi, et. al., “Making Sense,” 142.

³⁸ Kristopher Gerardi, et. al., “Making Sense,” 127-128, 141-142.

294 run average growth, analysts did not predict that housing price levels or valuations also would
295 revert.³⁹

296 **IV. What financial instruments were related to the financial crisis?**

297 The demand for subprime mortgages increased in parallel with rapid growth in the supply of
298 credit for subprime lending. To follow how the supply of credit changed, however, we must first
299 understand some of the financial instruments related to financial crisis (MBSs, CDSs, and
300 CDOs).

301 **A. Mortgage-Backed Securities (MBSs)**

302 A mortgage-backed security (MBS) is a type of asset-backed security (ABS) secured by a
303 collection (or pool) of mortgages. The owner of an MBS receives interest and principal derived
304 from the mortgage payments made by a particular group of individual homeowners.
305 Securitization changes a group of mortgages into an MBS.⁴⁰

306 A government-sponsored entity (e.g., Fannie Mae or Freddie Mac) or a third-party financial
307 company (e.g., commercial or investment banking firm) purchases mortgages and securitizes
308 them. Typically, the “issuer” (e.g., a GSE or bank) purchases hundreds of loans from a mortgage
309 lender and transfers them into a pool. The issuer usually sells the pool of loans to a Special
310 Purpose Entity (SPE)⁴¹ – typically a bankruptcy-remote trust⁴² – created by the issuer for this
311 purpose. The SPE creates and sells the MBSs to investors.

312 To deal with default and prepayment risk (the risk that the homeowner will prepay the
313 mortgage), the issuer uses subordination, overcollateralization, excess spread, and insurance.

314 Subordination refers to the practice where the issuer divides the MBSs into different portions or
315 tranches:

- 316 • Senior tranches (rated AAA),
- 317 • Mezzanine tranches (AA to BB), and
- 318 • Equity tranches (unrated).

319 The issuer applies portfolio losses to the tranches in reverse order of seniority and offers those
320 investing in junior tranches higher coupons (interest rates) to compensate for the added default
321 risk. For example, if the AAA tranche comprised 75 percent of the SPE, an investor in the AAA
322 tranche would assume that s/he would not suffer loss of cash flow until 25 percent of the
323 mortgages in the SPE had defaulted or had been prepaid.

³⁹ Kristopher Gerardi, et. al., “Making Sense,” 138-139.

⁴⁰ Richard Rosen, “The role of securitization in mortgage lending,” Chicago Fed Letter, November 2007, 1.

⁴¹ People use the terms “special purpose entity” and “special purpose vehicle” interchangeably. While we will use only the term “special purpose entity” in this paper, what we say applies equally to a “special purpose vehicle.”

⁴² Firms use bankruptcy-remote SPEs widely in mortgage securitizations. The firm forms the SPE concurrently with or immediately prior to the securitization. Firms use an SPE because an SPE rarely becomes insolvent as a result of its own transactions and because SPEs may insulate their investors from the consequences of any related party’s (e.g., the arranger’s) insolvency.

324 Overcollateralization refers to the situation where the issuer has a larger principal balance
325 outstanding on the mortgages in the pool than the combined principal balance on the MBSs.

326 The term “excess spread” refers to the practice where the issuer has larger interest payments
327 coming into the pool from the mortgage holders than the interest payments going out of the pool
328 to pay the holders of the MBSs.⁴³

329 Sometimes the issuer may simply insure tranches to deal with default or prepayment risk.

330 Securitization can enable the spread of loan default risk. Rather than purchasing a single
331 mortgage, an investor purchases an interest in a pool of mortgages, which may provide
332 geographic diversification. Securitization provides another advantage for investors in that the
333 credit rating attached to the tranche provides additional information about the relative risk of the
334 investment. Consequently, the investor may invest in mortgages at a much lower information
335 cost, without having to investigate each individual mortgage holder and loan.

336 *B. Credit Default Swaps*

337 Credit default swaps (CDSs) are insurance-like contracts that promise to cover losses on
338 specified securities if a certain “credit event” (e.g., a bankruptcy, a default on bond payments, or
339 a restructuring) occurs to a particular firm (“reference entity”) within a specified period of time.
340 A CDS is a private contract in which the parties typically do not exchange money at the start of
341 the contract. Instead the parties make payments during the specified time frame of the CDS.⁴⁴

342 The party buying the “insurance” pays a premium known as the “spread” on a quarterly basis.
343 The spread equals a certain number of basis points per annum of the CDS’s notional value. For
344 example, if the spread is 20 basis points, or 0.2 percent, then an investor buying \$10 million
345 worth of protection from an insurer must pay the insurer \$20,000 per year (or \$5,000 each
346 quarter). If a bond subject to the CDS defaults, the investor receives the par value of the
347 defaulted bond.⁴⁵

348 A CDS spread typically increases as the referenced entity’s creditworthiness declines. A swap
349 buyer can cash in on an increase in the spread by selling it to someone else who wishes to be on
350 the insured side of the swap. So, if during the term of the contract the riskiness of the underlying
351 security goes up and the spread increases by 10 basis points (that is, increases to 30 basis points
352 from 20), the investor can profit from selling the swap.

353 *C. Collateralized debt obligations (CDOs)*

354 Issuers sometimes collect and securitize pools of bonds to create another type of asset-backed
355 security, known as a collateralized debt obligation (CDO).⁴⁶ Like the issuer of an MBS, the
356 issuer of a CDO establishes an SPE, which acquires a portfolio of credit instruments (e.g.,

⁴³ Richard Rosen, “The role of securitization,” 3.

⁴⁴ Mark Adelson, “Credit Default Swap (CDS) Primer,” Nomura Fixed Income Research, May 21, 2004, 2-3.

⁴⁵ Mark Adelson, “CDS Primer,” 3; Roland Beck, “The CDS Market: A primer,” Deutsche Bank Research, 3 and 11.

⁴⁶ One may create a CDO from several types of assets. For example, some issuers created CDOs from credit default swaps. We, however, will focus on CDOs created from MBSs.

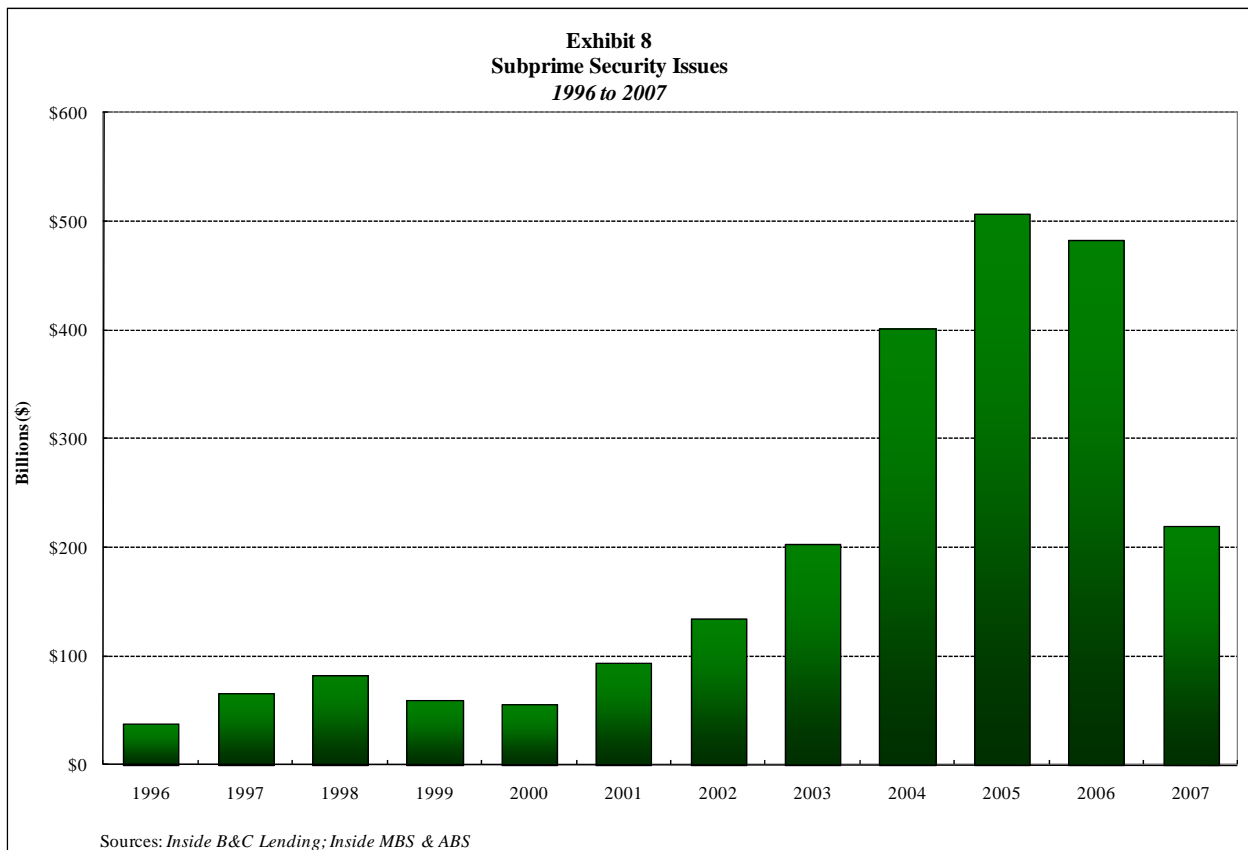
357 MBSs). The SPE pays the investors in the CDO from the cash flows of the assets (in this case,
358 MBSs).

359 Again, like the MBS, the issuer divides the CDO into tranches (senior tranches rated AAA,
360 mezzanine tranches rated AA to BB, and unrated equity tranches) and applies losses in reverse
361 order of seniority. Because the lower tranches provide a buffer for the senior tranche, the CDO
362 can create AAA-rated investments using lesser-rated MBSs. That is, the issuer can take MBSs
363 rated AA and lower and create within the CDO an AAA tranche because the buyers of that AAA
364 CDO tranche will have a pool of other MBSs to act as a buffer from default or prepayment loss.

365 V. Increase in MBS securitization (supply of funds)

366 The securitization of *subprime* mortgage loans grew dramatically after 2000. (See Exhibit 8.)
367 The securitization rate – the security issuance as a percentage of loan origination that year – for
368 subprime mortgages increased from 37 percent in 1999 to 66 percent by 2002 and to 81 percent
369 by 2006.⁴⁷ In addition, the dollar volume of subprime security issues increased rapidly from
370 \$55.9 billion in 2000 to a peak of \$507.7 billion in 2005. (See Exhibit 8.)

371



372

⁴⁷ *Inside MBS & ABS*.

373 At the same time, the amount of CDOs, backed by subprime MBSs, also grew rapidly. In 1995,
374 the issuance of CDOs was around \$10 billion.⁴⁸ According to the Securities Industry and
375 Financial Markets Association, aggregate global CDO issuance totaled USD157 billion in 2004,
376 USD272 billion in 2005, USD552 billion in 2006 and USD485 billion in 2007.⁴⁹ Three primary
377 factors appear to have driven this increase in supply:

- 378 • GSEs provided large-scale buyers for subprime mortgages,
- 379 • The rise of private label securitization resulted in other institutions securitizing
- 380 mortgages, and
- 381 • The market for credit derivatives, such as CDSs, also increased dramatically.

382 *A. Role of the GSEs in subprime market*

383 Three government-sponsored entities (GSEs) issue MBSs: Fannie Mae, Freddie Mac, and Ginnie
384 Mae.

385 Congress created the Federal National Mortgage Association (Fannie Mae) as part of the
386 National Housing Act of 1938 in order to buy mortgages from lenders. The influx of cash from
387 Fannie Mae allowed lenders to make additional loans. In 1968, Congress changed Fannie Mae
388 into a publicly traded company.⁵⁰ In 1970, the Federal Home Loan Mortgage Corporation
389 (Freddie Mac) began securitizing mortgages issued by Savings and Loan Associations.⁵¹ Fannie
390 Mae and Freddie Mac also issue and guarantee MBSs from pools of non-jumbo single-family
391 mortgages with balances below specified limits, known as conforming or prime loans.⁵²

392 Ginnie Mae (Government National Mortgage Association) guarantees the timely payment of
393 principal and interest of mortgages insured by the Federal Housing Administration, the
394 Department of Veteran Affairs, or the Rural Housing Service.⁵³ Ginnie Mae is a relatively small
395 player in the MBS market. In 2006 it guaranteed only 4 percent of all MBSs issued that year.⁵⁴

396 The GSEs became involved in the subprime market by changing the standards for qualifying
397 mortgages and then purchasing and securitizing subprime MBSs. By 2001, Fannie Mae had
398 become the seventh-largest issuer of subprime MBSs, issuing more than \$3 billion in such
399 securities.⁵⁵ The GSEs bought \$81 billion, \$175 billion, and \$169 billion in 2003, 2004, and
400 2005, respectively. These purchases of subprime mortgages by the GSEs freed the capital of
401 subprime mortgage originators and allowed the originators to make additional subprime loans.

⁴⁸ Joseph Mason, et. al, "How Resilient Are MBSs?" 27 (Figure 13).

⁴⁹ Securities Industry and Financial Markets Association, Global CDO Market Issuance Data (from Thomson Financial).

⁵⁰ Richard K. Green and Susan M. Wachter, "The American Mortgage in Historical and International Context," *Journal of Economic Perspectives*, Vol. 19, No. 4, Fall 2005, 96.

⁵¹ Richard K. Green, et. al., "The American Mortgage," 98.

⁵² Office of Federal Housing Enterprise Oversight, "A Primer on the Secondary Mortgage Market," Mortgage Market Note, July 21, 2008, 1; Richard Rosen, "The role of securitization," 2.

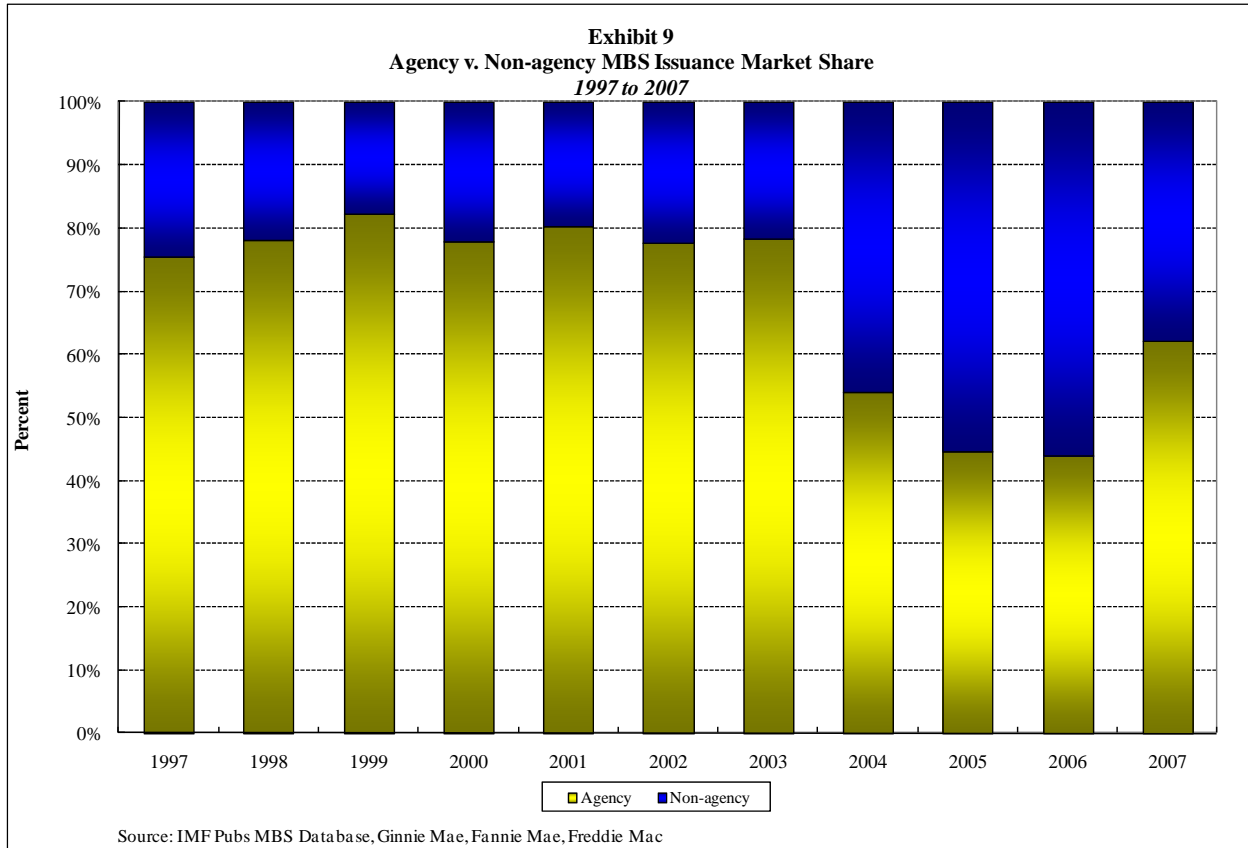
⁵³ Office of Federal Housing Enterprise Oversight, "Secondary Mortgage Market," 2.

⁵⁴ Richard Rosen, "The role of securitization," 2.

⁵⁵ *Inside B&C Lending*.

402 *B. The rise of private label securitization*

403 As the volume of subprime lending grew from 2003 to 2006, investment firms (non-agency
404 firms) began to grow their share of the mortgage securitization market, not by decreasing the
405 volume of GSE securitization, but by adding their own volume to that of the GSEs. This source
406 of funds, known as the private-label MBS market, surpassed the market share of the GSEs and
407 Ginnie Mae in 2005 and 2006. (See Exhibit 9.)



408
409

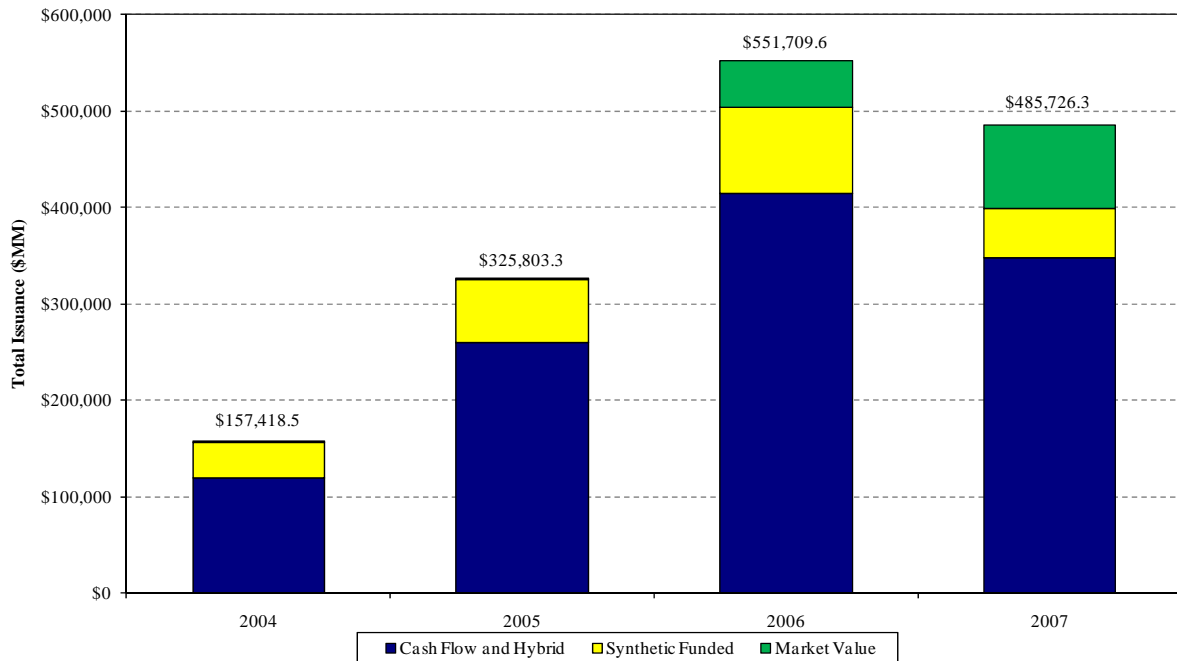
410 Lehman Brothers and Bear Stearns, along with other investment banks and primary mortgage
411 lenders that also securitized loans (such as Countrywide), were at the forefront of this market.
412 Lehman Brothers went from issuing \$3.6 billion in subprime MBSs in 1999 to issuing \$35
413 billion in 2005. Bear Stearns increased its issuance of subprime MBSs from \$536 million in 2000
414 to \$20.8 billion in 2005.⁵⁶

415 The issuance of CDOs (all of which were private-label securitizations) grew in parallel with the
416 issuance of MBSs – from less than \$10 billion in 1995 to more than \$500 billion in the global
417 market during 2006.⁵⁷ (See Exhibit 10.)

⁵⁶ *Inside B&C Lending; Inside MBS & ABS.*

⁵⁷ Securities Industry and Financial Markets Association, Global CDO Market Issuance Data (from Thomson Financial); Joseph Mason and Joshua Rosner, “How Resilient Are Mortgage Backed Securities?” 27.

**Exhibit 10
Global CDO Market Issuance Data**



Notes: Cash flow CDOs are structured to pay off liabilities with the interest and principal payments (cash flows) of their collateral. Hybrid CDOs combine the funding structures of cash and synthetic CDOs. Synthetic CDOs sell credit protection via credit default swaps (CDS) rather than purchase cash assets. Synthetic CDOs use credit default swaps (CDSs) to synthetically replicate a cash flow CDO. Funded tranches require the deposit of cash to an SPV at the inception of the deal to collateralize portions of the SPV's potential swap obligations in the transaction; losses result in principal writedowns of the issued notes. Market value CDOs are structured to support liabilities through the value of the collateral.
Source: Securities Industry and Financial Markets Association.

418

419 During 2005-2007, the percentage of structured finance CDOs – the collateral for which would
 420 include assets such as MBSs, CMOs,⁵⁸ and ABSs – as a percentage of all CDOs was 65 percent,
 421 57 percent, and 52 percent, respectively. Although the data we use reflect the global market, the
 422 total CDOs issued in dollars formed the vast majority of the CDOs issued, representing 76
 423 percent, 76 percent, and 69 percent, respectively, of all CDOs issued during 2005, 2006, and
 424 2007.⁵⁹

425 The CDO product became so popular with investors that issuers could not keep up with the
 426 demand. The issuers then created synthetic CDOs that contained no actual MBSs.

⁵⁸ CMOs are collateralized mortgage obligations. The issuer of a CMO divides the pool of mortgages into tranches based on the time to maturity. The fast-pay tranche receives all principal payments made on the entire mortgage pool and will be paid off first. Other tranches receive interest payments only until the tranches with shorter maturities are satisfied. The slow-pay tranche will have the longest-term class and will receive principal payments only after all other tranches have been paid off. Zvi Bodie, A. Kane, and A. Marcus, *Investments* 3rd ed. (Irwin-McGraw-Hill, 1996), p. 20.

⁵⁹ Securities Industry and Financial Markets Association, *Global CDO Market Issuance Data* (from Thomson Financial).

427 A synthetic CDO or “CDO-squared” is a type of CDO that references credit default swaps in
428 underlying CDO portfolios rather than purchasing cash assets for the portfolios.⁶⁰ In other words,
429 the performance of synthetic CDOs is based on conceptual cash-flow calculations and
430 valuations, rather than the performance of a physical asset.

431 Synthetic CDO issues grew from \$37 billion in 2004 to \$89 billion in 2006, before declining to
432 \$52 billion in 2007. The synthetic CDO issues during 2007 foreshadowed the events of 2008.
433 During that year, issuances of synthetic CDOs fell from \$27 billion in the first quarter to \$4
434 billion in the fourth quarter.⁶¹

435 *C. The market for CDSs grew with the market for MBSs/CDOs*

436 As we noted in Section IV.C., commercial banks, which loaned money to companies and wanted
437 to hedge against potential default by the company, would buy credit default swaps where the
438 reference entity was the corporate borrower. Insurance companies, such as AIG, sold such
439 swaps.⁶² Furthermore, the creation of synthetic CDOs, which depended upon CDSs to replicate a
440 cash-flow CDO, played a sizable role in the global CDO market. By the end of 2004, the Bank
441 for International Settlements reported that the notional amount of CDSs outstanding had risen to
442 \$6.4 trillion.

443 While notional amounts outstanding (the gross nominal value of all deals concluded, but not yet
444 settled on the reporting date) provide a measure of market size, they are not the amounts truly at
445 risk.⁶³ A measure of what is at risk comes from gross market values or the sums of the
446 replacement values of all contracts for any particular dealer.⁶⁴ As shown in Exhibit 11, the
447 amounts at risk grew from \$133 billion at the end of 2004 to approximately \$2 trillion by the end
448 of 2007. By the end of 2008, the amount at risk had almost tripled to approximately \$6 trillion.

⁶⁰ Michiko Whetten, Nomura Fixed Income Research, “CDOs-Squared Demystified,” February 4, 2005, 1-2. One can also invest in a *cash* CDO-squared composed of a portfolio of tranches of CDOs. We focus on *synthetic* CDOs-squared because they form the more important market segment.

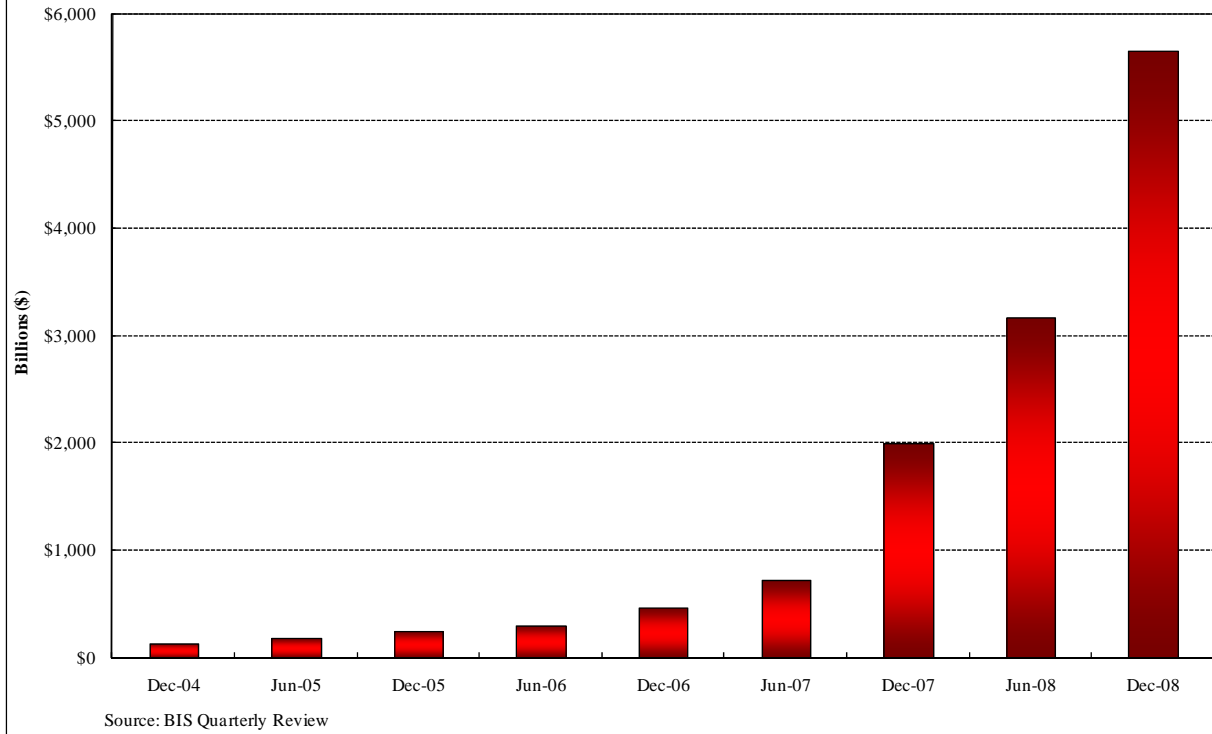
⁶¹ Securities Industry and Financial Markets Association, Global CDO Market Issuance Data (from Thomson Financial).

⁶² Mark Adelson, “CDS Primer,” 2.

⁶³ Bank for International Settlements, Monetary and Economic Department, “OTC derivatives market activity in the second half of 2008,” May 2009, 5.

⁶⁴ Bank for International Settlements, Monetary and Economic Department, “OTC derivatives market activity in the second half of 2008,” May 2009, 5.

Exhibit 11
Credit Default Swaps - Gross Market Values
2004 to 2008



449

450 The CDS market is largely unregulated. Parties can trade CDS contracts without oversight
 451 guaranteeing that the buyer (on the insurer side of the contract) has the resources to cover losses
 452 if the security defaults. The huge jump in the amount at risk in the last half of 2007 indicated a
 453 future financial crisis should the buyer/insurer lack the resources to cover losses from security
 454 defaults.

455 **VI. Change in the composition of banks' balance sheets**

456 Changes in the demand for and supply of subprime mortgages led to changes in the business
 457 models and balance sheets of the largest publicly traded U.S. commercial and investment
 458 banks.⁶⁵ Either directly or through their purchased subsidiaries, these banks became the
 459 originators of subprime mortgages, as well as the issuers and underwriters of securitizations
 460 containing subprime mortgages. In turn, these banks increased their investment in MBSs. The
 461 increased amount of MBS investments, the increased use of repurchase agreements, and their
 462 small amounts of equity compared to the amount of assets combined to subject these banks to
 463 more liquidity risk than in the past.

464 By the end of 2007, the ratio of MBS and ABS assets to stockholders' equity for the largest U.S.
 465 banks (that also are among the largest issuers of MBSs) equaled 1.67, on average. That is, if the

⁶⁵ We focus on these commercial and investment banks because we have access to their data through SEC filings and because their experience mirrors what has occurred this year at smaller institutions. The banks on which we focus include: Bank of America, Bear Stearns, CitiGroup, Goldman Sachs, JPMorgan Chase, Lehman Brothers, Merrill Lynch, Morgan Stanley, Washington Mutual, and Wells Fargo.

466 average bank had \$100 billion in stockholders' equity, it would also hold on average \$167 billion
467 in MBSs and ABSs. Over the course of 2008, the value of these MBS and ABS assets declined,
468 rumors about AIG's possible insolvency began, and Lehman Brothers went into bankruptcy. As
469 banks began reporting even further losses and faced increasing demands for larger discounts on
470 the value of the collateral securing their rollover debt obligations (repos), they froze their lending
471 – and the financial crisis exploded.

472 A. *Subprime lending and securitizing shifts from consumer finance companies to*
473 *thrifts and commercial and investment banks*

474 Prior to 1998 two broad types of subprime lenders existed: (1) consumer finance companies that
475 kept the loans they made on their balance sheets (e.g., Household Finance and Associates First
476 Capital) and (2) lenders that immediately securitized the loans and removed them from their
477 financial statements (e.g., The Money Store and AMRESKO). At this point, traditional mortgage
478 banks focused on prime mortgages.⁶⁶

479 According to data from *Inside B&C Lending*, in 1997 the top five lenders originated \$28.8
480 billion in subprime mortgages with a market share of 23.1 percent. The top 25 lenders in 1997
481 originated \$77.7 billion with a market share of 62.4 percent. (See Exhibit 12.)

⁶⁶ Brenda White, "A Short History of Subprime," *Mortgage Banking*, March 1, 2006, p. 1.

Exhibit 12
Top 25 B&C Lenders
1997, 2003, and 2006

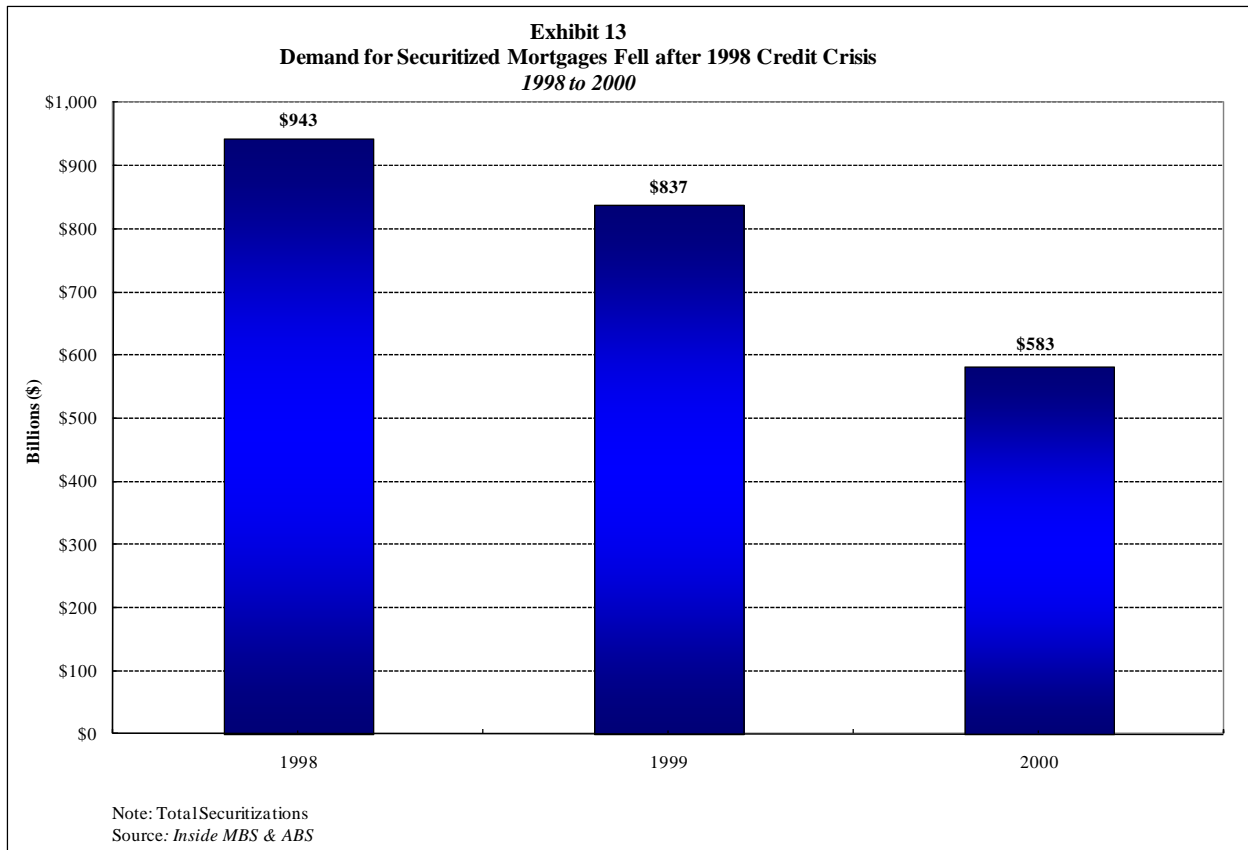
1997		2003		2006	
Company Name	Volume (Bil)	Company Name	Volume (Bil)	Company Name	Volume (Bil)
1 Associates First Capital	\$6.98	1 Ameriquest Mortgage	\$39.00	1 HSBC Finance	\$52.80
2 The Money Store	\$5.93	2 New Century	\$27.40	2 New Century Financial	\$51.60
3 IMC Mortgage Company	\$5.86	3 CitiFinancial	\$21.43	3 Countrywide Financial	\$40.60
4 ContiMortgage Corp.	\$5.50	4 Household Finance	\$20.34	4 CitiMortgage	\$38.04
5 Firstplus	\$4.53	5 Option One Mortgage	\$20.14	5 WMC Mortgage	\$33.16
6 GMAC/RFC	\$3.83	6 First Franklin Financial Corp	\$20.08	6 Fremont Investment & Loan	\$32.30
7 AMRESKO Residential Credit	\$3.64	7 Washington Mutual	\$19.85	7 Ameriquest Mortgage	\$29.50
8 Household Financial Services	\$3.50	8 Countrywide Financial	\$19.83	8 Option One Mortgage	\$28.79
9 Green Tree Financial	\$3.48	9 Wells Fargo Home Mortgage	\$16.49	9 Wells Fargo Home Mortgage	\$27.87
10 Advanta Mortgage	\$3.47	10 GMAC-RFC	\$13.98	10 First Franklin Financial Corp	\$27.67
11 Commercial Credit Co.	\$3.34	11 Fremont General Corp.	\$13.11	11 Washington Mutual	\$26.60
12 United Companies	\$3.10	12 Aegis Mortgage Corporation	\$8.24	12 Residential Funding Corp	\$21.20
13 EquiCredit	\$2.91	13 WMC Mortgage	\$8.18	13 Aegis Mortgage Corp	\$21.00
14 Beneficial Corp.	\$2.78	14 Chase Home Finance	\$8.04	14 American General Finance	\$15.07
15 Aames Capital Corp.	\$2.14	15 Accredited Home Lenders	\$7.96	15 Accredited Home Lenders	\$15.77
16 New Century Financial Corp.	\$1.97	16 BNC Mortgage Inc.	\$7.04	16 BNC Mortgage	\$14.50
17 Southern Pacific Funding	\$1.96	17 American General Finance	\$5.67	17 Chase Home Finance	\$11.55
18 WMC Mortgage Corp.	\$1.95	18 Key National Home Equity	\$5.45	18 Equifirst	\$10.75
19 Saxon Mortgage	\$1.82	19 Aames Capital Corp.	\$5.37	19 NovaStar Financial	\$10.23
20 Option One Mortgage	\$1.82	20 Encore Credit Corp.	\$4.53	20 Ownit Mortgage Solutions	\$9.50
21 Long Beach Mortgage	\$1.69	21 Equity One	\$4.11	21 ResMae Mortgage Corp	\$7.66
22 Cityscape Financial	\$1.66	22 Finance America	\$3.79	22 Mortgage Lenders Network	\$6.00
23 Countrywide Home Loans	\$1.42	23 NovaStar Financial	\$3.62	23 ECC Capital Corp	\$5.48
24 Delta Funding	\$1.26	24 Centex Home Equity Corp.	\$3.61	24 Fieldstone Mortgage Company	\$4.99
25 Alliance Funding Co.	\$1.20	25 Saxon Mortgage	\$2.84	25 Nationstar Mortgage	\$4.62
Total for Top 25 Lenders	\$77.71	Total for Top 25 Lenders	\$310.08	Total for Top 25 Lenders	\$543.24
Total B&C Originations	\$124.50	Total B&C Originations	\$332.00	Total B&C Originations	\$600.00
Top 25 Market Share	62.4%	Top 25 Market Share	93.4%	Top 25 Market Share	90.5%

Source: *Inside B&C Lending*

482

483 During 1998-2000 a series of crises reshaped the subprime lending industry. The Asian financial
484 crisis, the devaluation of the Russian ruble, and the failure of Long Term Capital Management
485 (LTCM) resulted in a “flight to quality” and an increased demand for U.S. Treasuries. In turn,
486 these events led to a decreased yield on U.S. Treasuries and significant losses on hedge positions
487 of subprime lenders, as well as a decreased demand for securitized mortgages.⁶⁷ (See Exhibit
488 13.)

⁶⁷ Souphala Chomsisengphet, et.al., “The Evolution of the Subprime Mortgage Market,” 40; Brenda White, “A Short History,” 2.



489

490 Next, a wave of restatements occurred that related to the valuations of residuals (i.e., the
 491 remaining cash flow after securitization from mortgages the lenders retained on their balance
 492 sheets) and erased the entire net values of several subprime lenders. Five of the 20 largest
 493 subprime lenders filed for bankruptcy, and the parent of the second-largest subprime lender (The
 494 Money Store) announced that its subprime subsidiary would cease operations.⁶⁸

495 In the aftermath of these crises, commercial banks and thrifts acquired a number of subprime
 496 lenders. Washington Mutual (WaMu) acquired Long Beach Financial Corporation, Citigroup
 497 acquired Associates First Capital, Chase Manhattan acquired Advanta Mortgage Corporation,
 498 and HSBC Finance Corporation acquired Household Finance.⁶⁹ The market share of the five
 499 largest subprime lenders increased from 23.1 percent to 38.6 percent between 1997 and 2003,
 500 and the market share of the 25 largest subprime lenders increased from 62.4 percent to 93.4
 501 percent over the same period. (See Exhibit 12.)

502 Banks originally formed a critical link between investors and subprime mortgage lenders,
 503 enabling lenders to make more loans. Lenders established lines of credit with banks – pipelines
 504 of short-term funds allowing the lenders to continue originating new loans. The subprime lenders
 505 typically agreed to sell their mortgages to the banks for securitization in exchange for their lines
 506 of credit. Then the banks began to acquire subprime mortgage lenders. Lehman Brothers bought

⁶⁸ Brenda White, "A Short History," 2.

⁶⁹ Brenda White, "A Short History," 2.

507 BNC Mortgage, JPMorgan Chase bought EMC Mortgage Corporation, Merrill Lynch bought
 508 First Franklin, and Morgan Stanley bought Saxon Capital. (See Exhibit 14.)

509 By 2007, the identities of the top subprime mortgage originators, securitizers, and underwriters
 510 were much the same. (See Exhibit 14.) For example, Countrywide was the third largest
 511 originator, the second largest issuer, and the fifth largest underwriter of subprime MBS. Morgan
 512 Stanley was the top subprime MBS underwriter in 2007 and the third largest issuer of subprime
 513 MBS. Through Morgan Stanley's investment in Saxon Mortgage, it also was the eighteenth-
 514 largest originator of subprime mortgages. A comparison of the top 25 subprime lenders, the top
 515 25 subprime MBS issuers, and the top 10 subprime MBS underwriters reflects four entities in all
 516 three categories, ten additional entities among the largest originators/issuers, three more among
 517 the largest issuers/underwriters, and one additional firm among the largest
 518 originators/underwriters.
 519

Exhibit 14											
Connections in Subprime											
Top Subprime Mortgage Lenders in 2007				Top Subprime MBS Issuers in 2007				Top Subprime MBS Underwriters in 2007			
Company Name		Volume (mil)	Mkt Share	Company Name		Volume (mil)	Mkt Share	Company Name		Volume (mil)	Mkt Share
1	CitiMortgage, NY	\$19,700	10.2%	1	Merrill Lynch	\$22,085	10.1%	1	Morgan Stanley	\$26,727	12.2%
2	HSBC Finance, IL	\$17,992	9.3%	2	Countrywide Financial	\$17,272	7.9%	2	Merrill Lynch	\$24,156	11.0%
3	Countrywide Financial, CA	\$16,993	8.8%	3	Morgan Stanley	\$17,212	7.8%	3	RBS Greenwich Capital Markets	\$20,626	9.4%
4	Wells Fargo Home Mortgage, IA	\$15,416	8.0%	4	Option One (owned by H&R Block)	\$16,266	7.4%	4	Lehman Brothers	\$18,357	8.4%
5	First Franklin Financial Corp., CA (owned by National City Corporation)	\$13,480	7.0%	5	Lehman Brothers	\$11,980	5.5%	5	Countrywide Securities	\$16,231	7.4%
6	Chase Home Finance, NJ	\$11,520	6.0%	6	Bear Stearns	\$9,339	4.3%	6	Bear Stearns	\$14,246	6.5%
7	Option One Mortgage, CA	\$11,179	5.8%	7	Barclays	\$7,485	3.4%	7	Citigroup	\$13,363	6.1%
8	EMC Mortgage Corp., TX (owned by JPMorgan Chase)	\$7,912	4.1%	8	CIT Group	\$7,242	3.3%	8	Deutsche Bank	\$12,267	5.6%
9	Ameriquest Mortgage, CA	\$6,400	3.3%	9	Deutsche Bank	\$7,009	3.2%	9	JPMorgan Chase	\$11,532	5.3%
10	BNC Mortgage, CA (owned by Lehman Brothers)	\$6,100	3.2%	10	Residential Funding Co. (owned by GMAC)	\$6,916	3.2%	10	Bank of America	\$9,113	4.2%
11	Washington Mutual, WA	\$5,500	2.9%	11	Ameriquest Mortgage	\$6,837	3.1%	Total for Top 5 Underwriters		\$106,097	48.4%
12	WMC Mortgage, CA (owned by General Electric)	\$5,000	2.6%	12	JPMorgan Chase	\$6,716	3.1%	Total for All Underwriters		\$219,364	
13	New Century Financial, CA	\$4,700	2.4%	13	Washington Mutual	\$5,876	2.7%				
14	American General Finance, IN (owned by AIG)	\$4,500	2.3%	14	Wells Fargo	\$5,756	2.6%				
15	Equifirst, NC (owned by Barclays)	\$4,350	2.3%	15	HSBC	\$5,129	2.3%				
16	Aegis Mortgage Corp., TX (owned by Cerberus)	\$4,300	2.2%	16	Credit Suisse	\$5,004	2.3%				
17	Residential Capital LLC (owned by GMAC/GM)	\$4,244	2.2%	17	New Century	\$4,715	2.1%				
18	Saxon Mortgage, VA (owned by Morgan Stanley)	\$4,125	2.1%	18	CBASS	\$4,654	2.1%				
19	Accredited Home Lenders, CA	\$4,003	2.1%	19	Nationstar Mortgage	\$4,616	2.1%				
20	Delta Financial Corp., NY (privately owned)	\$3,577	1.9%	20	RBS Greenwich Capital	\$3,997	1.8%				
	Total for Top 20 Lenders	\$170,991	88.8%	21	Goldman Sachs	\$3,892	1.8%				
	Total for All Lenders	\$192,500		22	WMC Mortgage (owned by General Electric)	\$3,713	1.7%				
				23	Accredited Home Lenders	\$3,351	1.5%				
				24	NovaStar Mortgage	\$3,201	1.5%				
				25	UBS Warburg	\$3,053	1.4%				
					Total for Top 10 Issuers	\$122,805	56.0%				
					Total for All Issuers	\$219,364					

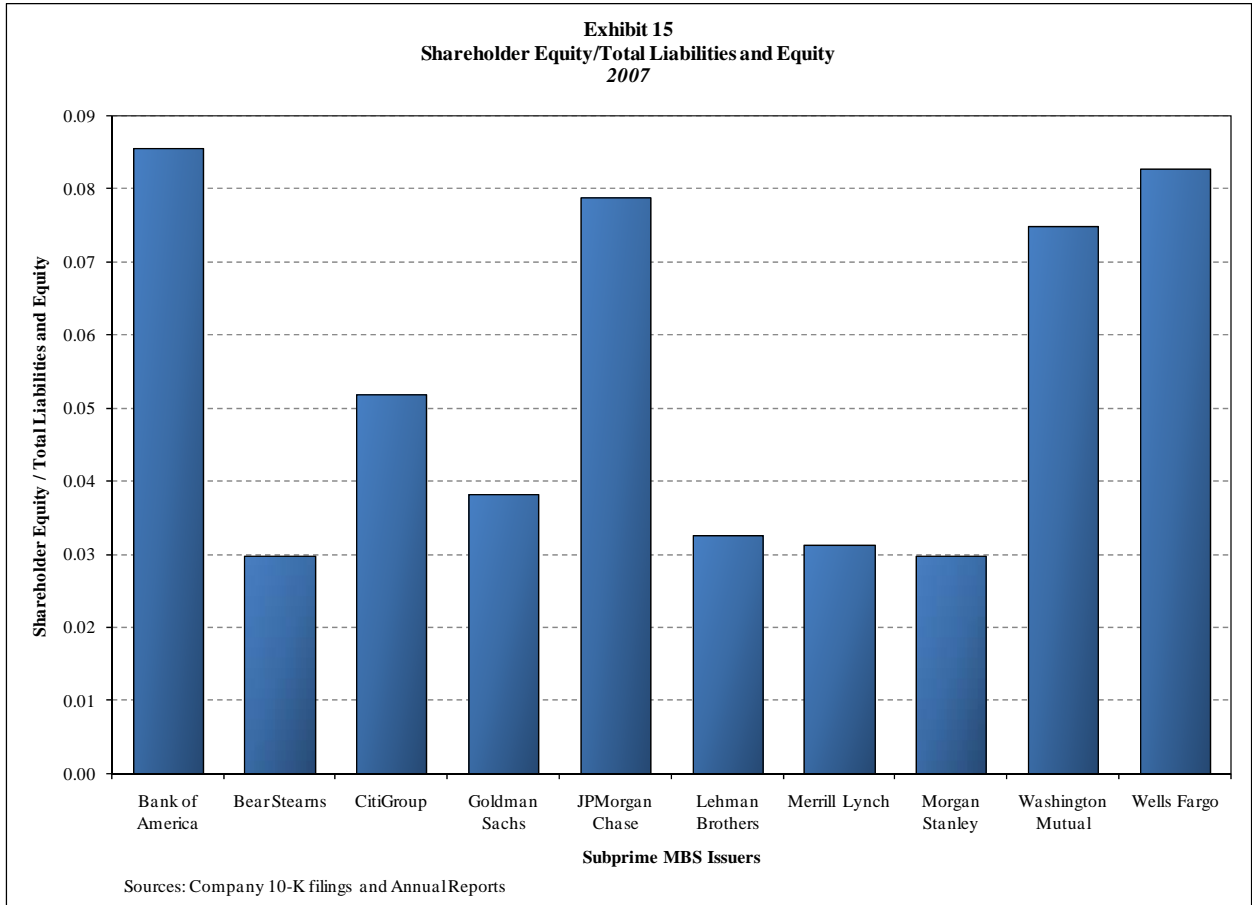
Source: *Inside B&C Lending*

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522 **B. Change in composition of the assets of the banks' balance sheets**

523 At the end of 2007, the banks had billions of dollars in equity. Of the banks we examined, Bear
 524 Stearns had the lowest amount of shareholders' equity, totaling \$12 billion. Lehman Brothers
 525 and Washington Mutual had the next smallest amounts of equity in the group, totaling \$22 and

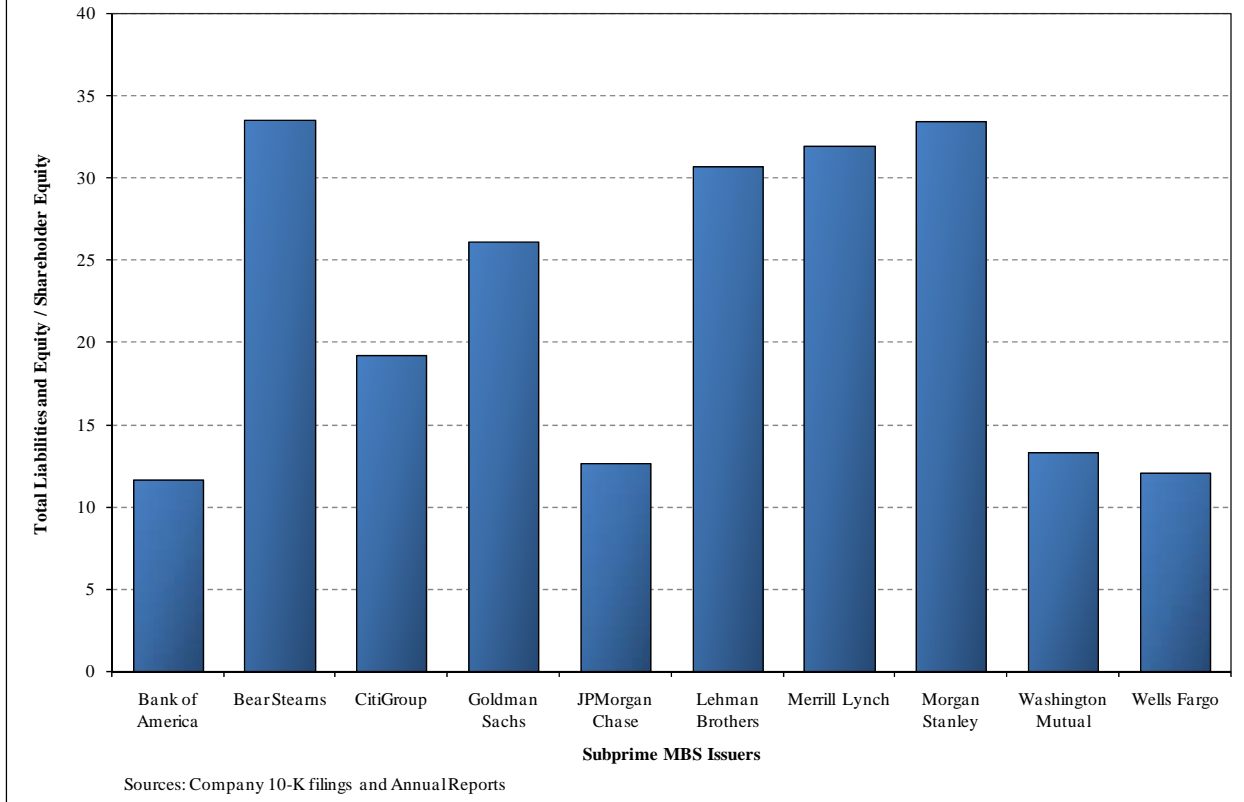
526 \$25 billion, respectively. With so many billions of dollars available to absorb losses, one might
527 expect the banks to have had the ability to overcome a decline in a particular asset class. Those
528 billions of dollars, however, equaled less than nine percent of total liabilities plus equity (or total
529 assets). (See Exhibit 15.)



530

531 Put differently, the banks were leveraged at more than 11 to 1. (See Exhibit 16.)

Exhibit 16
Total Liabilities and Equity / Shareholder Equity
2007

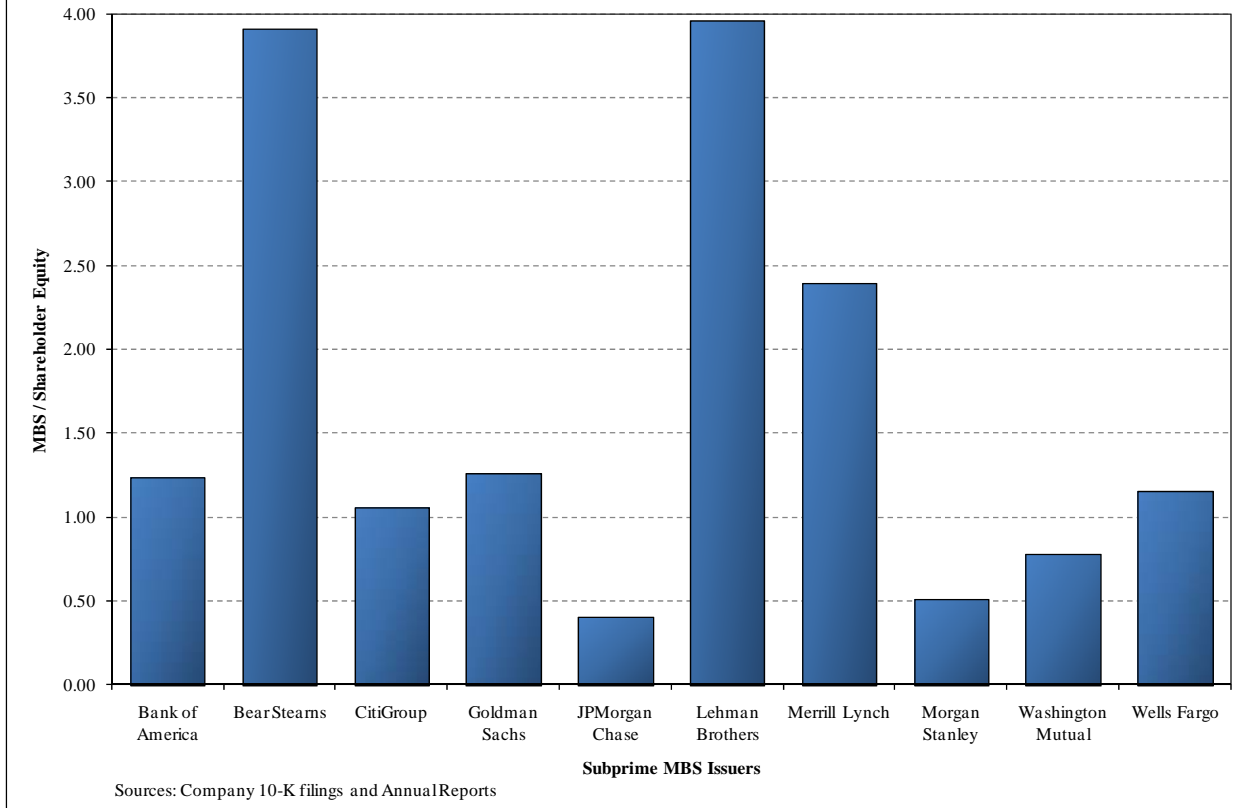


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534 Analyzing the dollar amount of shareholders' equity or the percentages of debt and equity at the
 535 banks did not take into account the increased amount of the mortgage, mortgage-backed, and
 536 asset-backed securities (MBS portfolios) held by the banks. Between 2002 and 2007, for
 537 example, Lehman increased the amount of its MBS portfolio from \$34 billion to \$89 billion.
 538 Bear Stearns increased its MBS portfolio from \$20 billion to \$46 billion. Merrill Lynch
 539 increased its MBS portfolio from \$65 billion to \$77 billion. CitiGroup increased its MBS
 540 portfolio from \$42 billion to \$120 billion. Bank of America increased its MBS portfolio from
 541 \$66 billion to \$182 billion.

542 Instead of examining shareholders' equity or liabilities versus the amount of the banks' assets at
 543 the end of 2007, a better focus would have been the ratio of the MBS portfolio to shareholders'
 544 equity. Of the 10 banks we examined, at the end of 2007 Bear Stearns and Lehman held MBS
 545 portfolios almost four times larger than the value of their shareholders' equity. Of the other eight
 546 banks, the average ratio of the MBS portfolio to shareholders' equity equaled 1.10. (See Exhibit
 547 17.)

Exhibit 17
MBS/Shareholder Equity
2007



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C. Change in composition of the liabilities of the banks' balance sheets

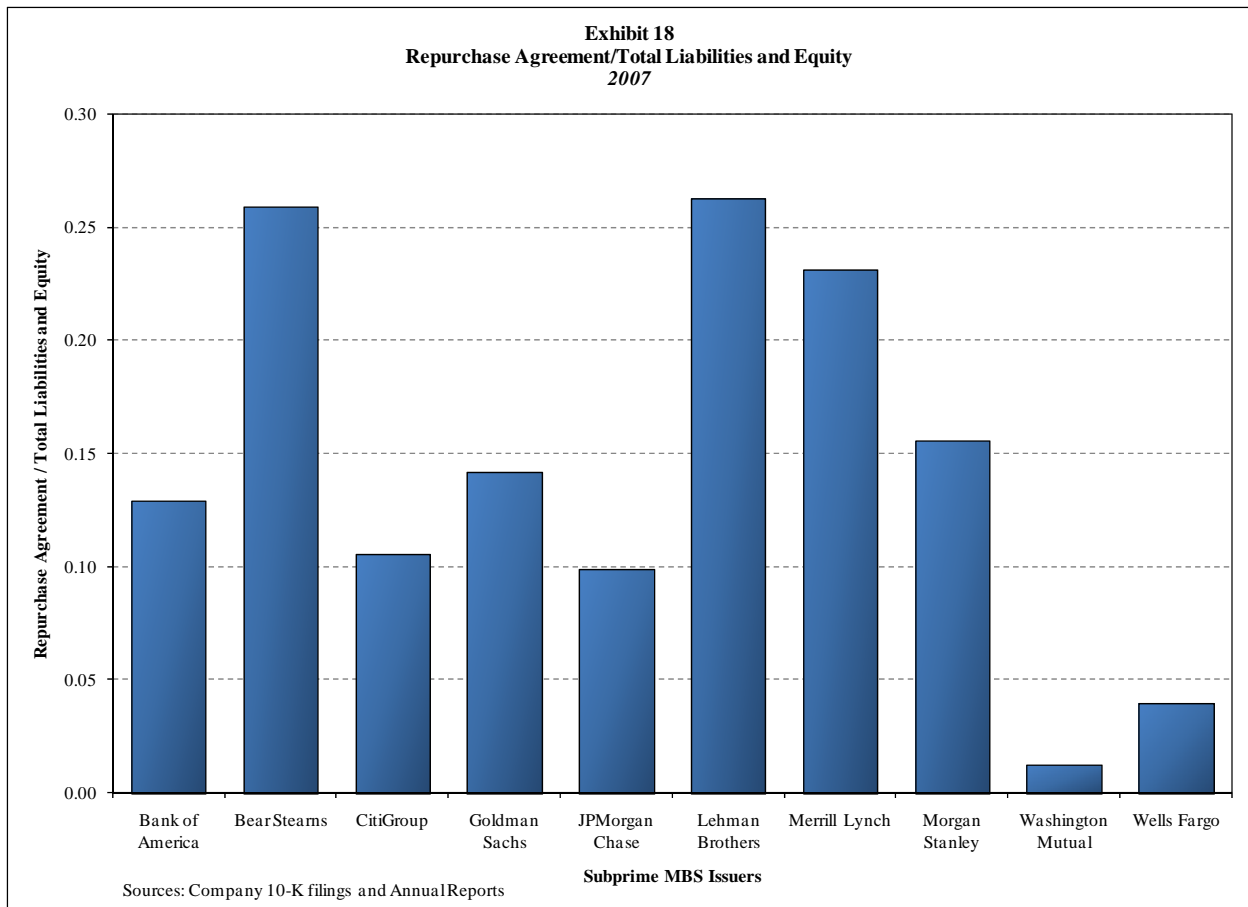
551 The banks found they faced another problem in addition to the risk of declining asset values in
 552 their MBS portfolios. Banks had become increasingly reliant on using financing from repurchase
 553 agreements (often overnight borrowing), instead of bond sales (long-term debt).

554 In a repurchase agreement (repo), a bank sells a security (e.g., MBS) for cash and commits to
 555 buying back that security from the purchaser at a set cash price and on a set date. In essence, the
 556 parties view this transaction as a collateralized loan wherein the bank borrows money and uses
 557 the MBS as collateral. The term of this collateralized loan is generally quite short (often
 558 overnight). The bank finds an advantage in this transaction because the cost of using repos is less
 559 than the cost of selling bonds. The purchaser/lender also has the advantage of receiving a yield
 560 on a short-term collateralized transaction in a very liquid market.⁷⁰ While both parties are subject
 561 to credit risk, the purchaser/lender may lessen credit risk by lending less than the market value of

⁷⁰ Frank J. Fabozzi and Steven V. Mann, "Repurchase and Reverse Repurchase Agreements," in *Securities Finance*, edited by Frank J. Fabozzi and Steven V. Mann, (John Wiley & Sons, 2005), 222.

562 the security. One refers to the difference between the loan amount and the market value of the
563 collateral as the “repo margin” or “haircut.”⁷¹

564 By the end of 2007, many of the banks we examined used repos as an important part of their
565 financing. (See Exhibit 18.) For eight of the ten banks, the percentage of assets financed by repos
566 ranged from approximately 10 percent (CitiGroup and JPMorgan Chase) to more than 25 percent
567 (Bear Stearns and Lehman Brothers). In fact, seven of the ten had larger amounts of repos than
568 equity financing their assets. This situation was not unusual. Gorton and Metrick (2009) cite a
569 study reporting that the top U.S. investment banks financed approximately one-half of their
570 assets using repurchase agreements. In addition, the banks used MBSs as collateral in these
571 repos.⁷²



572

573

574 In these transactions the purchaser/lender received collateral from the banks in exchange for the
575 banks’ rollover debt. As the value of the MBSs dropped, therefore, the counterparties to the
576 rollover debt demanded more collateral. For example, assume that originally the
577 purchaser/lender agreed that \$100 million of MBSs would serve as collateral for a \$100 million

⁷¹ Frank J. Fabozzi, et. al., “Repurchase and Reverse Repurchase Agreements,” 226.

⁷² Gary B. Gorton and Andrew Metrick, “Haircuts,” National Bureau of Economic Research Working Paper 15273 (August 2009), 4.

578 overnight repo. Later that purchaser/lender might demand a “haircut” related to the collateral and
579 would inform the bank that now \$120 million (not \$100 million) of MBSs would serve as
580 collateral for that same \$100 million overnight repo. As the value of banks’ MBS portfolios
581 continued to drop, purchasers/lenders would not accept subprime MBSs as collateral at all, and
582 demanded substantial increases in haircuts related to the collateral for non-subprime
583 instruments.⁷³

584 Any bank that had sizable amounts of repos in excess of its cash balances backed by MBSs in
585 2008 faced liquidity risks. What happened to Bear Stearns serves as an example of a case where
586 a bank (1) increased its investment in subprime securitizations, (2) had a small percentage of
587 equity, and (3) had repo debt.

588 Bear Stearns’ ratio of book value of assets to book value of total stockholders’ equity equaled
589 37.06, 28.96, and 33.53, in fiscal years 1997, 2002, and 2007, respectively. While Bear Stearns’
590 leverage did not change dramatically between 1997 and 2007, the composition of its assets and
591 the manner in which it financed those assets changed.

592 At the end of fiscal year 1997 (June), Bear Stearns had \$1.2 billion in cash, \$38.4 billion in
593 financial instruments (at fair value), and the book value of its assets equaled \$121 billion. By
594 fiscal year 2007 (November), Bear Stearns had \$21.4 billion in cash, \$138 billion in financial
595 instruments (at fair value), and another \$34 billion of variable interest entities and mortgage loan
596 special purpose entities, and the book value of its assets equaled \$395 billion. At face value, Bear
597 Stearns’ assets did not appear that different at the end of the 10-year period.

598 Of the \$138 billion in financial instruments owned at fair value, however, Bear Stearns had to
599 value \$24.4 million using internally developed models (Level 3 in the GAAP hierarchy), rather
600 than market transaction values (Level 1 in the GAAP hierarchy).⁷⁴ The book value of Bear
601 Stearns’ stockholders equity in 2007 equaled \$12 billion, and the market value of its equity
602 equaled \$11.5 billion. Therefore, if the fair value of Bear Stearns’ financial instruments and the
603 value of its variable interest entities and mortgage loan special purpose entities had fallen by
604 only 7 percent [7 percent = $12 / (138 + 34)$], the book value of Bear Stearns’ equity would have
605 been wiped out. Either the downturn in the MBS market or the market’s lack of confidence in the
606 Level 3 models Bear Stearns used to value its financial instruments at fair value might cause a
607 decrease in the value of its assets.

608 Next, consider the effects on Bear Stearns’ repos. In 2007, Bear Stearns listed its repo debt as
609 \$102 billion. Assume that Bear Stearns had to refinance much of this repo debt daily. If the repo
610 market believed that Bear Stearns had insufficient collateral, which would place the repo market
611 basically in an unsecured position, the repo market would refuse to roll over the repo debt and

⁷³ Gary B. Gorton, et. al., “Haircuts,” 7-8.

⁷⁴ The fair value hierarchy used by Bear Stearns ranks the quality and reliability of the information used to determine fair value. The fair value of Level 3 assets and liabilities is based on unobservable inputs that are not corroborated by market data. “These instruments are typically illiquid, long dated or unique in nature and therefore engender considerable judgment by traders and their management who, as dealers in many of these instruments, have the appropriate knowledge to estimate data inputs that are less readily observable. For certain instruments, extrapolation or other methods are applied to observed market or other data to estimate assumptions that are not observable.” (Bear Stearns 10-K for the fiscal year ended November 30, 2007)

612 force Bear Stearns to repay all of it in a short period of time. In the case of overnight repos, this
613 time would have equaled a single day or less. Bear Stearns only had a cash position of \$21
614 billion. Even if we assume that Bear Stearns could have used all \$21 billion to repay its repo
615 debt, Bear Stearns would still have had a potential shortfall of \$81 billion in its liquidity position
616 if the repo market closed. Hence, the loss of only 7 percent (or even less than 7 percent) of the
617 total value of Bear Stearns' financial instruments, its variable interest entities, and its mortgage
618 loan special purpose entities could have caused a liquidity crisis as the overnight market
619 demanded repayment and Bear Stearns did not have sufficient cash.

620 Bear Stearns' investments in subprime securities, coupled with small amounts of equity relative
621 to the investment in subprime securities and large amounts of rollover debt relative to the bank's
622 cash position, resulted in the sale of Bear Stearns to JPMorgan Chase on March 16, 2008, for \$2
623 dollars per share – an amount that the parties later renegotiated to \$10 per share. Fourteen
624 months earlier, on January 27, 2007, Bear Stearns' share price had equaled \$171.51.

625 **VII. Conclusion**

626
627 The Bear Stearns collapse turned out to be a warning of things to come. According to the Case-
628 Shiller 10-city composite index, housing prices declined another 19 percent in 2008. By
629 September 2008, the seriously delinquent rate equaled 23 percent for subprime mortgages and 11
630 percent for Alt-A mortgages.

631 The decline in the real estate market eventually resulted in the inability of banks to sell MBSs or
632 CDOs. Without an active market in MBSs and CDOs, banks could not easily value these
633 financial instruments on their balance sheets in accordance with fair value accounting rules
634 requiring the use of exit values (or sale prices) in such valuations.

635 On July 11, 2008, regulators seized IndyMac Bank, the largest thrift to fail in the U.S.

636 A litany of financial industry woes followed in September 2008.

- 637 • Regulators seized control of Fannie Mae and Freddie Mac on September 7.
- 638 • Bank of America acquired a financially distressed Merrill Lynch on September 14.
- 639 • Lehman Brothers declared bankruptcy on September 15.
- 640 • On September 16, AIG received an emergency loan from the U.S. government. AIG had
641 ceased selling CDSs in 2005, but had collateral triggers on many of its CDSs sold after
642 losing its AAA rating. The collateral triggers required AIG to post additional collateral
643 whenever AIG or the reference entity of the CDSs suffered a ratings drop. Because of
644 AIG's vast exposure to CDSs, some estimated the collateral amount AIG owed at this
645 time to be in the range of \$100 billion.
- 646 • Last, on September 17, Reserve Primary Fund, a large money-market fund, announced
647 that its net asset value had fallen below its benchmark of \$1-per-share because of its
648 investment in debt securities issued by the then-bankrupt Lehman Brothers.

649 Lending dropped precipitously as banks began to conserve their cash in order to master their
650 liquidity risks. Equities lost an astonishing amount of their value as shown by the 29.3 percent

651 decline in the S&P 500 that occurred between September 2 and December 31, 2008. A financial
652 crisis affecting far more than banks was underway.

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