Accounting in and for the Subprime Crisis

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March 2008

The genesis of this essay is my luncheon speech at the American Accounting Association's Financial Accounting and Reporting Section Mid-Year Meeting on January 26, 2008; I thank Anne Beatty for gently suggesting this opportunity to me. I also thank Dan Dhaliwal for encouraging me to write up the speech in an expanded form including implications for research and teaching. Finally, I also appreciate the comments of participants at presentations at the Financial Accounting Standards Board and the Financial Accounting Standards Advisory Council in March 2008.

ABSTRACT: This essay describes implications of the subprime crisis for accounting. First, I overview the institutional and market aspects of subprime mortgages and other positions, focusing on those with the greatest relevance for accounting. I explain how the investment performance of subprime-mortgage-related positions has a binary quality that depends on subprime mortgagors' ability to obtain cash-out refinancing. I describe how the subprime crisis evolved in four waves that roped in more positions and affected those positions more severely over time. Second, I discuss the critical aspects of FAS 157's definition of fair value and guidance for fair value measurements. I explain the practical difficulties that have arisen in applying that definition and guidance to subprime positions in the current illiquid markets. I also raise a potential issue regarding the application of FAS 159's fair value option. Third, I discuss issues that have arisen regarding sale accounting for subprime mortgage securitizations under FAS 140 and consolidation of securitization entities under FIN 46(R) associated with foreclosures and modifications of mortgages. Fourth, I indicate ways that accounting academics can address the implications of the subprime crisis in their research and teaching.

KEYWORDS: Subprime crisis; credit crunch; fair value accounting; securitization.

DATA AVAILABILITY: All data presented in this essay are available from public sources.

I. INTRODUCTION

The purpose of this essay is to describe implications of the subprime crisis and the credit crunch it has engendered (collectively the "subprime crisis," except when necessary for clarity) for accounting, meaning recognized accounting numbers and disclosures that elucidate those numbers.[1] These implications depend on the interplay among attributes of subprime mortgages and other positions, the evolution of market prices and illiquidity during the crisis, and the requirements of the applicable accounting standards. While credit losses on subprime positions are recorded under various standards, I focus on losses recorded based on the fair value measurement guidance provided in FAS 157, *Fair Value Measurements*. I also discuss issues that have arisen in accounting for securitizations of subprime assets under FAS 140, *Accounting for Transfers and Servicing of Financial Assets and Extinguishment of Liabilities*, and for the entities used in these transactions under FIN 46(R), *Consolidation of Variable Interest Entities.*

My intended audiences are preparers, auditors, and users of financial reports who must deal with the crisis as it unfolds and accounting standard setters, researchers, and teachers who want to use the crisis as learning experience for themselves and their students. While sadly costly and disruptive to families, firms, and the overall economy, I deem the subprime crisis to be the signal researchable-teachable moment of my two-decade-plus career as an accounting academic focused on financial reporting by financial institutions for financial instruments and transactions. I believe that accounting and other academics have the responsibility to understand and employ the crisis to the benefit of our disciplines, students, and society.

The subprime crisis began in earnest in February 2007 and has entered its second year with a vengeance. In July 2007, the subprime crisis ended a three-year period of unprecedented

[1] For discussions of the economic/regulatory/public policy implications of the subprime crisis, see The President's Working Group on Financial Markets (2008) and Senior Supervisors Group (2008).

global liquidity and spawned the credit crunch. Since then, market illiquidity has become increasingly broad and severe in several distinct waves over time, and now extends well beyond the markets for subprime positions. For example, it is now difficult for lenders to raise or maintain financing of many types of consumer loans, including credit card, automobile, and student loans, and so borrowers increasingly cannot obtain such loans. Bond financing has dried up for all but the best corporate and municipal credits, in part due to concerns about the capitalization and exposures of the major bond insurers. The potential for further contagion appears high, with even prime mortgages looking shaky. Many parties now view the subprime crisis as the worst real estate, credit, and very possibly overall economic crisis in the United States since the Great Depression.[2]

Notably, there have been observable feedback effects between the subprime crisis and the credit crunch. As firms have announced losses on subprime positions, debt markets have become more averse to holding those positions and increasingly illiquid, causing the fair values of the positions to decline further and become more difficult to measure. A likely reason for these feedback effects is the opacity of many subprime positions. This opacity is attributable in part to the complex partitioning of the risks of these positions through (re)securitizations, credit derivatives, and other financial transactions. It is also attributable in part to the fact that many subprime positions are off-balance sheet in the so-called "shadow banking system." As a result of this opacity, market participants now either aggressively price protect themselves when bidding for those positions or avoid them altogether. Many holders of the positions have now

[2] While by no means an economic historian, my own view is the subprime crisis poses far more daunting challenges for economic policymakers than those posed by the two most analogous sets of events that have occurred since I entered accounting academia in 1982: the thrift/life insurer/junk bond crisis of the mid-late 1980s–early 1990s and the Russian debt/hedge fund crisis in the second half of 1998. While both of these prior crises also yielded large losses on subprime postions and considerable market illiquidity, the economic problems they raised were more contained and fixable through intervention by policymakers and by firms reworking their business models and processes.

"capitulated" and are selling subprime positions at virtually any price to remove the perceived taint from their balance sheets. Various other types of adverse feedback effects are evident in the economy and of deep concern to economic policymakers.

Subprime mortgages have two economic attributes that drive their credit losses. The first attribute—which has been well understood by market participants since no later than the Russian debt/hedge fund crisis of 1998—is the frequency of defaults on subprime mortgages is low if mortgagors are able to obtain cash-out refinancing and high otherwise. Cash-out refinancing typically is obtainable only in periods when house prices have appreciated since the mortgage origination and the markets for credit risky debt are sufficiently liquid. The second attribute—which is plain obvious—is the magnitude of the loss given default of a mortgage rises with house price depreciation since the time of the origination of the mortgage. The almost unprecedented levels of house price depreciation and market illiquidity in the subprime crisis together have yielded very high frequencies of default and losses given default. These situations almost surely will get worse before they get better, because of ongoing house price depreciation and resets of teaser interest rates on over half a trillion dollars of adjustable-rate mortgages.

Credit losses on subprime mortgages flow through to the investment performance of numerous positions that are based directly or indirectly on them. These positions include subprime mortgage backed securities (MBS), collateralized debt obligations (CDOs), credit derivatives and other types of financial guarantees, and liquidity support arrangements. More junior positions have been affected sooner and more severely, all else being equal, but even the most senior positions have been adversely affected.

Some parties have tried to pin the blame for the subprime crisis on fair value accounting, typically pointing to the obvious difficulties of measuring the fair values of subprime positions in

the current illiquid markets and the feedback effects noted above.[3] This is untenable. The subprime crisis was caused by firms and households making bad operating, investing, and financing decisions, managing risks poorly, and in some instances committing fraud. The best way to stem the credit crunch and damage caused by these actions is to speed the price adjustment process by providing market participants with the most accurate and complete information about subprime positions. While imperfect, fair value accounting provides better information about these positions and is a better platform for mandatory and voluntary disclosure than alternative measurement attributes, including any form of cost-based accounting.

This is not to say that guidance for the measurement of fair values in illiquid markets cannot be improved. While FAS 157 provides a clearer definition of fair value and considerably expanded guidance specifying how fair value should be measured than prior GAAP, the current market illiquidity has raised significant challenges for the interpretability of this definition and guidance. FAS 157's definition of fair value reflects the idea that there can be "orderly" transactions based on the conditions that exist at the "measurement date." During the subprime crisis, this idea has become increasingly difficult to sustain even in thought experiments and, more importantly, practically useless as a guide to preparers' estimation of fair values. FAS 157's fair value measurement guidance includes a hierarchy of inputs that favors observable market inputs over unobservable firm-supplied inputs, but that ultimately requires preparers to employ "the assumptions that market participants would use in pricing the asset or liability." This hierarchy provides little help to preparers who have to decide whether to base their fair valuations on the poor quality signals currently being generated by markets versus highly judgmental firm-supplied inputs such as forecasts of house price depreciation. For the duration of

[3] See Johnson (2008) and Rummell (2008). In addition, U.S. Representative Barney Frank, the chairman of the United States House of Representatives' Financial Services Committee, has asked for fair value accounting rules to be reconsidered.

the crisis, preparers will need to exercise considerably more than the usual professional judgment to apply FAS 157's language to their specific circumstances. I recommend the FASB consider reworking or supplementing this language to more directly confront the problem of market illiquidity, which is, after all, when fair values are both most difficult to estimate yet most important to users of financial reports.

As the successive waves of the subprime crisis have hit, firms have repeatedly and sharply revised upward their estimates of credit losses. These revisions are inevitable consequences of how the subprime crisis evolved, and they do not imply there have been any problems either with accounting standards or how preparers have applied them. However, these revisions and the high potential for further upward revisions have contributed to the aforementioned feedback effects between reported losses and market illiquidity. Needless to say, this market illiquidity is damaging our real estate and credit markets and overall economy, and it needs to be cured through means that do not simply push the problem into the future. As always, essential components of such a cure is for firms to provide relevant, reliable, and understandable financial report information and for users to conduct careful and dispassionate analysis of that information.

The remainder of the essay is structured as follows. In Section II, I overview the institutional and market aspects of subprime mortgages and other positions, focusing on those with the greatest relevance for accounting. I define "subprime" and provide a brief history of subprime mortgages and other assets, for simplicity focusing on mortgages throughout the essay. I describe the various types of positions created in subprime mortgage securitizations and the general nature of the accounting for those positions. I emphasize how the investment performance of these positions has a binary quality that depends on subprime mortgagors' ability

to obtain cash-out refinancing. I discuss how the subprime crisis has evolved in four waves that have roped in more positions and affected those positions more severely over time. In Section III, I describe the critical aspects of FAS 157's definition of fair value and guidance for fair value measurements. I describe the practical difficulties that have arisen in applying that definition and guidance to subprime positions in the current illiquid markets. I also discuss a potential issue regarding the application of FAS 159, *The Fair Value Option for Financial Assets and Financial Liabilities*, in the subprime crisis. In Section IV, I discuss issues regarding sale accounting for subprime mortgage securitizations under FAS 140 and consolidation of securitization entities under FIN 46(R) associated with foreclosures and modifications of mortgages. In Section V, I indicate ways that accounting academics can address the implications of the subprime crisis in their research and teaching. Section VI contains my concluding remarks.

II. INSTITUTIONAL AND MARKET BACKGROUND

A Brief History of "Subprime" Prior to the Crisis

During the period of very high market interest rates from the late 1970s to early 1980s, bankers and bank regulators used the adjective "subprime" to refer to the high proportion of commercial loans that yielded below the prime rate, primarily because banks wanted to retain these borrowers during this period. This is basically opposite to, and should not be confused with, the current meaning of the term.

Since early 1995, if not before, bankers and others have used "subprime" to refer to less than highly creditworthy assets (e.g., subprime mortgages) that yield higher interest rates than do prime assets with similar non-credit risks. It also refers to the parties (e.g., subprime lenders, borrowers, and guarantors) and transactions (e.g., subprime securitizations) involved with those

assets. This meaning of "subprime" came about at that time because securitization and other markets to sell or transfer the credit risk of credit risky assets had begun to develop in earnest. Mortgages and automobile loans were the first types of subprime loans to experience significant volume, because they are homogeneous and collateralized by real property, and so their credit risk is relatively diversifiable and borrower-unspecific and thus assessable by potential investors. The subprime lending industry grew very quickly over the next few years. For example, by 1997 subprime mortgage originations were about 15% of total residential mortgage originations in the United States ($125 billion out of $859 billion).[4]

"Subprime" quickly found its way into the popular press, typically being used as a pejorative. On September 4, 1995, Nanette Barnes refers to subprime borrowers as "potential deadbeats." On January 28, 1996, Jane Bryant Quinn wrote even more evocatively: "Ten years ago, you might have been poison; now you're merely a 'subprime borrower.'"

The credit risk involved with subprime lending became evident during the Russian debt/hedge fund crisis in the second half of 1998. This crisis was triggered by the Russian government's announcement on August 17, 1998 of a moratorium on external debt payments and a significant devaluation of the ruble. A classic "flight to quality" ensued in which debt market participants shunned credit risky investments in favor of high credit quality investments. Credit spreads roughly doubled in the two weeks following this announcement, with credit risky rates rising and riskless rates falling in similar measures. The markets to sell credit risky assets became illiquid, and so most subprime lenders could not securitize or sell their subprime mortgage inventory at a profit. Many became illiquid and had to stop originating new subprime loans. Many subprime mortgagors found it hard to refinance their mortgages and so defaulted at high rates. Because house prices had begun robustly appreciating by late 1998, however, the

[4] Chomsisengphet and Pennington-Cross (2006).

losses given default were fairly small except for subprime home equity mortgages that only hold second liens on the mortgaged properties. Still, investors in junior subprime MBS and similar positions generally suffered significant losses during this crisis, which persisted beyond the end of the year.

While some subprime lenders went bankrupt during this crisis, others survived, frequently as a result of an injection of capital from one or more outside investors. New Century Financial—which played a significant role at the inception of the subprime crisis described below—is an example of the latter.

Subprime lenders learned from the Russian debt/hedge fund crisis, at least for a while. The surviving lenders typically focused on better credit quality subprime borrowers. As a result, the industry experienced a fairly quiet, moderate-growth period through 2003. For example, subprime mortgage originations from 2001-2003 were only about 8% of total residential mortgage originations, barely half the percentage in 1997.

Toward the end of 2003, however, the following partly preexisting and partly new conditions combined to induce a explosion in subprime mortgage lending, which exceeded 20% of total residential mortgage originations in each year from 2004 to 2006 and into early 2007.

- After taking large losses on corporate positions as a result of the technology bust and recession during 2000-2002, many large commercial banks changed their strategic focus to retail banking, including subprime mortgage banking.
- As depicted in Figure 1, beginning around 1997 national housing prices appreciated at a rapid rate. Hence, during most of the short history of the subprime mortgage banking industry, losses given default had been fairly low even when the mortgagors defaulted at high rates, as they had done in 1998 and again in the 2001 recession and its aftermath.

Market participants appeared to believe that such low losses given default would continue.

- Also depicted in Figure 1, starting around 1990 fixed mortgage interest rates generally declined over time and hit a 40-year low in June 2003, keeping housing relatively affordable despite the rapid house price appreciation.
- After a period of extremely highly growth in prime mortgage originations from $0.9 trillion in 2000 to $3.4 trillion in 2003, these originations declined at the end of 2003 because mortgage prepayment and refinancing slowed as fixed mortgage interest rates rose slightly from their June 2003 low. Mortgage originators and securitizers that had become accustomed to high volume then turned to subprime mortgages.

This explosion of subprime mortgage lending was also explained in part by declining credit spreads after 2003, which allowed originators to reduce the rates they offered on subprime mortgages even as the rates on prime mortgages increased slightly. As depicted in Figure 2, Panel A, from 2004 on credit spreads first gradually and then sharply declined and were very low by historical standards from 2005 through mid-2007. Remarkably, despite the subprime crisis having begun in earnest in February 2007, credit spreads bottomed out in June 2007 immediately prior to the beginning of the credit crunch. This resulted primarily from unprecedented liquidity in global financial markets and investors searching for higher yields driving down the price of credit risk.

Lenders' competition to originate subprime mortgages and the decline in credit spreads caused the percentage gains on sale from securitization of subprime mortgages to drop sharply over time. For example, in its Form 10-K filings, Countrywide Financial reports percentage gains on sale of 4.43% in 2003, 3.64% in 2004, 2.01% in 2005, and 1.84% in 2006. Troublingly, this

declining profitability occurred as the credit risk of newly originated subprime mortgages increased, as discussed below.

Attributes of Subprime Mortgages

The boundary between prime (A) and non-prime (near prime or subprime) mortgages is vaguely determined by four main attributes of the mortgagor and the mortgage.

1. Mortgagors' FICO (Fair Isaac Corporation) credit scores primarily capture their payment histories (i.e., of delinquencies, defaults, and bankruptcies) and the type and amount of their debt outstanding and available via credit lines. FICO scores are intended to capture the probability of the borrower declaring bankrupcy, defaulting, or being more-than-90-days delinquent over a two-year horizon.[5]
2. Mortgages' loan-to-value ratios are the amounts of mortgage principal plus accrued points or other interest divided by the assessed values of the mortgaged properties. Combined loan-to-value ratios include piggyback second (home equity) mortgages.
3. Mortgagors' front and back debt-to-income ratios are their housing-related principal, interest, insurance, and real estate tax payments (the numerator of the front ratio) or their housing-related payments plus other fixed payments, including other debt payments, alimony, child support, etc., (the numerator of the back ratio) divided by their gross income.
4. Whether the mortgagors' income and assets are documented by the borrower and verified by the lender.

Some sense for the boundary between prime and non-prime mortgages is provided by the following four criteria for "conforming" mortgages, which are mortgages that may be purchased

[5] For further discussion of FICO scores, see http://www.creditscoring.com/creditscore/fico/

or guaranteed by Fannie Mae or Freddie Mac. Conforming mortgages typically are viewed as prime, although lower quality conforming mortgages have some subprime characteristics. For each of these four criteria, I provide rough comparables for most or many subprime mortgages.

- The mortgagor's FICO score must be above 660, compared to the low 600s or 500s for most subprime mortgagors.
- The loan-to-value ratio must be less than 80% or the mortgagor must purchase private mortgage insurance, compared to close or equal to 100% (especially when piggyback second mortgages are included) with no mortgage insurance for many subprime mortgages.
- The mortgagor's front (back) debt-to income ratio must be less than 28% (36%), compared to a front ratio of 50% or more for many subprime mortgages.
- There must be documentation/verification of the mortgagor's income and assets, compared to limited or none for many subprime mortgages.

There are many different grades of non-prime mortgages. Alt-A or near-prime mortgages generally are made to mortgagors with FICO scores well above the conforming threshold of 660 but that have higher than conforming loan-to value or debt-to-income ratios or less than full documentation/verification of their income and assets. Subprime mortgages range from A-, the best quality, through the middle grades B and C, to D, the worst quality. No clear industry guidelines exist as to what mixes of attributes qualify borrowers for these grades. This is explainable in part by the fact that tradeoffs exist among the various attributes and in part by different originators offering distinct mortgage products or serving distinct geographical areas with different housing market characteristics, economic conditions, and demographics.

Even A- subprime mortgages are considerably credit riskier than conforming mortgages on the criteria listed above and how they are layered. For example, New Century describes its underwriting guidelines for A- mortgages in an April 14, 2006 securitization prospectus.[6]

> Under the "A-" risk category, an applicant must have a credit score of 500, or greater, based on loan-to-value ratio and loan amount. A maximum of three 30 day late payment and no 60 day late payments within the last 12 months is acceptable on an existing mortgage loan. No bankruptcy may have occurred during the preceding two years for borrowers with credit scores of less than 660; provided, however, that a Chapter 7 bankruptcy for a borrower with a credit score in excess of 550 (or 580 under the stated income documentation program) may have occurred as long as such bankruptcy is discharged at least one day prior to funding of the mortgage loan. A maximum loan-to-value ratio of 90% is permitted with respect to borrowers with Chapter 7 bankruptcy, which Chapter 7 bankruptcy is discharged at least one day prior to mortgage loan funding. A borrower in Chapter 13 bankruptcy may discharge such bankruptcy with the proceeds of the borrower's mortgage loan (any such mortgage loan may not exceed a 90% loan-to-value ratio), provided that such borrower has a credit score of at least 550 (or 580 with respect to stated income documentation programs). The mortgaged property must be in at least average condition. A maximum loan-to-value ratio of 90% (or 80% for mortgage loans originated under the stated income documentation program), is permitted for a mortgage loan on a single family owner occupied or two unit property. A maximum loan-to-value ratio of 85% (or 75% for mortgage loans originated under the stated income documentation program), is permitted for a mortgage loan on a non-owner occupied property. A maximum loan-to-value ratio of 85% (or 75% for mortgage loans originated under the stated income documentation program), is permitted for a mortgage loan on an owner occupied high-rise condominium or a three to four family residential property. The maximum loan-to-value ratio for rural, remote, or unique properties is 80%. The maximum combined loan-to-value ratio, including any related subordinate lien, is 100%, for a refinance loan and 100%, for a purchase money loan. The maximum debt service-to-income ratio is usually 50% unless the loan-to-value ratio is reduced.

Moreover, New Century notes that it makes substantial number of exceptions to these guidelines.

Reflecting this higher credit risk, Pennington-Cross (2003) estimates that for the 1995-1998 period (toward the end of which housing prices began to appreciate at a robust rate), credit losses were five to six times higher on A- subprime mortgages than on prime mortgages. As we

[6] New Century also discusses its underwriting guidelines for AA and A+ subprime mortgages in this prospectus. These categories (which nominally sound better than prime/A mortgages) are for better quality A- subprime mortgages. http://www.sec.gov/Archives/edgar/data/1303871/000088237706000207/0000882377-06-000207-index.htm.

have begun to experience, this ratio should rise as housing prices decline (up to the point where credit losses on prime mortgages begin to rise sufficiently, which we may yet see).

Until about 2003, a very rough rule of thumb was that each grade down the ladder added 1% to the yield on a mortgage. That is, an average Alt-A mortgage yielded 1% more than an average prime mortgage, an average A- mortgage yielded 1% more than an average Alt-A mortgage, an average B mortgage yielded 1% more than an average A- mortgage, and so on.[7] These yield differentials more than halved during the 2004-early 2007 period as competition for originations intensified and credit spreads declined.[8]

The lack of clear industry guidelines suggests that the credit risk of subprime mortgages may be poorly captured by their assigned grades and credit spreads. This is most likely to occur when new risk attributes arise or existing risk attributes are layered in new ways, both of which occurred during the 2004-early 2007 period. For example, subprime mortgage banks' financial report disclosures indicate that most of these banks dramatically increased the proportion of nontraditional mortgages that delay payments compared to traditional 15- and 30-year amortizing mortgages that they originated. Such delayed-payment mortgages include interest-only and pay-option adjustable-rate mortgages that require or allow the mortgagor to choose to pay only interest each month, hybrid adjustable-rate mortgages with low "teaser" interest rates for initial periods of 2 or 3 years, and 40-year amortizing mortgages. While risk layering is difficult to observe from financial report disclosures, FitchRatings (2007) and T2 Partners LLC[9] (2008) provide evidence using loan-level data that from 2004 on delayed-payment mortgages were increasingly offered to and frequently chosen by mortgagors whose other attributes

[7] See Hayre (1999).
[8] See Chomsisengphet and Pennington-Cross (2006).
[9] T2 Partners LLC (2008) indicates it is short AMBAC and MBIA stock and has purchased credit derivatives on these firms.

indicated high risk (i.e., low FICO scores, high loan-to-value and debt-to-income ratios, and incomplete or no documentation/verification of income and assets). Various other types of risk layering also occurred.

Facilitated by lenders' lax underwriting, mortgage application fraud ("predatory borrowing") occurred to a considerable extent and in varied ways during this period. For example, mortgagors overstated their (unverified) income and assets or indicated they planned to live in the mortgaged homes, when in fact they intended to flip them for a speculative profit. Until mid-2007, mortgagors were able to increase their FICO scores by being listed as authorized users on one or more creditworthy parties' credit cards, possibly for a side payment. Mortgage brokers and real estate agents arranged mortgage originations for unqualified borrowers and fraudulent house sales to straw buyers and in order to receive commissions. Various other types of fraud also occurred.[10]

Keys et al. (2008) provide evidence that securitized subprime loans are more likely to default than are nonsecuritized loans with similar risk profiles. They interpret their results as suggesting that securitization adversely affects lenders' incentives to screen loans.

The Critical Attribute of Subprime Mortgages

Financially strapped subprime mortgagors often must refinance their mortgages at higher principal amounts, referred to as "cash-out refinancing," in order to avoid default. This critical attribute yields a binary quality to the investment performance of subprime-mortgage-related positions that depends on both the direction of house prices and debt market liquidity.

When house prices appreciate at a rapid rate and debt markets are adequately liquid, subprime mortgagors find cash-out refinancing easy to obtain, and so subprime mortgage

[10] See FitchRatings (2007) for extensive discussion of mortgage application fraud.

defaults are both low and uncorrelated across mortgages. When a default occurs, it generally reflects something specific about the mortgagor or the mortgaged property that prevents the mortgagor from obtaining cash-out refinancing despite its general availability. Hence, a default on one mortgage has minimal implications for defaults on other mortgages. Moreover, percentage losses on the mortgages that do default are relatively low if the mortgaged properties can be resold into an appreciating market. For these reasons, subprime-mortgage-related positions, even the most junior, generally experience good investment performance under these conditions.

In contrast, when house prices depreciate (or even just fail to appreciate) or debt markets are illiquid, subprime mortgagors find cash-out refinancing difficult to obtain, and so mortgage defaults are high and strongly positively correlated across mortgages. The positive correlation reflects the fact that a common macroeconomic factor, house price depreciation or debt market illiquidity, drives large numbers of defaults. Moreover, percentage losses on the mortgages that default are relatively high if the mortgaged property must be resold into a depreciating market. Under these conditions, subprime mortgage-related positions, possibly even the most senior ones, generally experience poor investment performance.

This binary quality is related to the well-documented vintage effects in subprime mortgage defaults.[11] Subprime mortgages originated in 2006 and 2007 have defaulted at considerably higher rates than those originated in prior years. For these vintages, the mortgagor's equity cushion generally declined after origination, frequently below zero, rendering cash-out refinancing impossible for many mortgagors.

This binary quality implies that accounting valuations of subprime-mortgage-related positions, even when based on ideal accounting standards applied as best as possible, tend to be

[11] See Demyanyk and van Hemert (2008).

dramatically off *ex post* whenever the direction of house prices changes. With the recent house price depreciation, valuations of subprime mortgage-related investments turned out to be too high *ex post*, and they were repeatedly revised downward as the successive waves of the subprime crisis hit. The opposite will be true whenever the current house price depreciation is replaced by house price appreciation. These effects appear at lower levels of house price depreciation for more junior subprime positions, but when those positions are wiped out, the effects pass on to more senior positions.

Subprime Mortgage Players, Positions, and Securitizations

As depicted in Figure 3, three main types of non-mutually-exclusive players assume three main types of subprime-mortgage-related positions that GAAP require to be accounted for differently. The first type of player is originators, who originate mortgages and typically hold them in inventory until they have accumulated enough to sell or securitize efficiently. During the holding period, originators are exposed to the credit and other risks of the mortgages. For accounting purposes, originators almost always classify the mortgages as held-for-sale. Held-for-sale loans are accounted for at lower of cost or fair value under SOP 01-6, *Accounting by Certain Entities (Including Entities with Trade Receivables) that Lend to or Finance the Activities of Others.*

The other two main types of players and positions arise when subprime mortgages are securitized. Before discussing these positions, I briefly describe the structural features of a typical subprime mortgage securitization.[12] The securitizer—who could be either the mortgage originator or another firm that purchased the mortgages from the originator—places mortgages in

[12] See Ryan (2007) and Chen, Liu, and Ryan (2008) for more detailed treatments of the structural features of securitizations.

a bankruptcy-remote entity that issues various tranches of MBS. These tranches are sequenced from most senior to most junior. The most senior tranche is sized as large as possible while still obtaining a AAA rating for that tranche from credit rating agencies. The most junior ("equity") tranche is unrated and sized as small as possible while still obtaining the lowest investment grade rating for the second most junior tranche. The securitizer retains the equity tranche in order to credit enhance (i.e., reduce the credit risk of) the other tranches, which usually are purchased by third parties.

Ignoring any other forms of credit enhancement (e.g., third-party guarantees), the equity tranche bears credit losses on the securitized mortgages first. If that tranche is wiped out by credit losses, then the second most junior tranche bears the incremental credit losses on the securitized mortgages until it is wiped out. And so on until all credit losses are absorbed.

Reflecting the binary quality described above, all of the MBS tranches are likely to experience good investment performance if house prices appreciate and debt markets remain liquid. In contrast, if house prices depreciate or debt markets become illiquid, most or all of the junior MBS tranches will be wiped out. Moreover, if house price depreciation is sufficiently large, even the most senior tranche will experience poor investment performance.

Subprime MBS rated AA or lower often are resecuritized in CDO securitizations, which create sequenced senior to junior tranches of CDOs. As in the original MBS securitizations, the most senior CDO tranche typically is sized to yield a AAA rating. While it may seem odd that higher-rated CDOs can be created out of lower-rated MBS, this is possible for two reasons. First, individual MBS experiencing losses in a CDO resecuritization pool need not experience complete losses, and so the portion that is not lost is effectively allocated to the most senior CDO tranche. Second, and more importantly, these pools are constructed to include diverse sets of

MBS from many different prior securitizations, and the losses on the individual MBS in the pool are expected to diversify considerably in most circumstances. However, subprime mortgages' binary quality discussed above implies that both of these reasons can fail when house prices depreciate, because losses on the underlying junior MBS will be both individually large and highly correlated. In periods of substantial house price depreciation, it is entirely possible that all of the MBS in a CDO resecuritization pool suffer near complete losses, so that even the most senior CDO issued based on those MBS loses much of its value. This in fact occurred during the third wave of the subprime crisis.

CDOs may themselves be resecuritized one or more times in so-called CDO^2, CDO^3, etc., resecuritizations. The issues just discussed are accentuated for these further resecuritizations.

Commercial paper (ABCP) and structured investment vehicle (SIV) securitizations are "conduit" securitizations in which the issued asset-backed securities have a shorter life than the underlying assets, and so the securities have to be rolled over at the end of their life to maintain the financing for the securitized assets. In these securitizations, either the securitizer or a bank usually provides liquidity support, that is, agrees to provide financing to the securitization conduit in the case the securities cannot be rolled over.

I return now to the other two main types of players and positions. The second main type of player is investors in the various tranches of MBS (CDO) securities that are backed directly (indirectly) by subprime mortgages. As discussed above, originators and securitizers are important subsets of investors. Investors usually classify these investments as trading or available-for-sale (AFS) securities under FAS 115, *Accounting for Certain Investments in Debt and Equity Securities*, although some investors may classify some securities as held-to-maturity

(HTM).[13] Both trading and AFS securities are accounted at fair value on the balance sheet, but periodic unrealized gains and losses are recorded in income for trading securities and in other comprehensive income for AFS securities. HTM securities are accounted for at amortized cost. Both AFS and HTM securities are subject to other-than-temporary impairments, in which unrealized gains and losses on the securities are recorded in net income.

The third main type of player is guarantors, broadly construed. The guarantor in a securitization typically is the originator, the securitizer, or a third-party monoline insurer. Similar to retention of junior tranches of securitizations, guarantees credit enhance some or all of the asset-backed securities issued in securitizations, and they are used for various other risk management purposes as well. Guarantees can be provided in various partly or wholly substitutable ways that are accounted for differently. Credit derivatives are accounted for at fair value under FAS 133, *Accounting for Derivative Instruments and Hedging Activities*. Other financial guarantees could be accounted for either as guarantees recognized at fair value at initiation under FIN 45, *Guarantor's Accounting and Disclosure Requirements for Guarantees, including Indirect Guarantees of the Indebtedness of Others*, or, if provided by an insurer, as insurance contracts under FAS 60, *Accounting and Reporting by Insurance Enterprises.* Because liquidity support generally does not meet FIN 45's characteristic-based definition of a guarantee, it usually is accounted for as a loss contingency under FAS 5, *Accounting for Contingencies*.

The Four Waves of the Crisis

The subprime crisis has arrived in (at least) four main waves thus far. Each wave was triggered or exacerbated by one or more firms' announcements of increased losses on subprime

[13] FAS 140, paragraph 14, requires interest-only strips and other prepayment-sensitive positions for which the holder would not recover substantially all of its recorded investment upon prepayment to be classified as either trading or AFS.

positions. As each successive wave hit, there has been increased loss severity for previously impaired positions and expansion of losses to new positions, which now extend well beyond subprime. The last three waves dramatically decreased the liquidity of markets for first subprime and then other positions. I describe each of these waves in some detail.

While problems with subprime mortgages became noticeable in the middle of 2006,[14] the first wave really hit on February 7, 2007 when New Century Financial, the second largest subprime mortgage originator in the United States in 2006, announced that it would restate its financial reports for the first three quarters of 2006 for inadequate allowances for repurchase losses.[15] New Century was contractually obligated to buy back mortgages it sold when the mortgages either experienced "early payment defaults"—which for New Century were typically defined as defaults in the first month after origination—or did not adhere to the representations and warranties New Century made when it sold the mortgages. At the time of sale, such recourse obligations should be recognized at fair value under FAS 140. Subsequently, these obligations should be recognized at the probable and reliably estimable losses under FAS 5. In its February 7, 2007 Form 8-K filing, New Century indicated that in the first three quarters of 2006 the allowance did not properly reflect the growing volume of repurchase requests or the increased expected loss on the disposition of repurchased loans. New Century also indicated that conditions deteriorated further in the fourth quarter of 2006.[16]

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[14] For example, Ameriquest, the largest subprime originator in 2005, signed a multi-state settlement regarding its mortgage lending practices in January 2006 and announced a major retrenchment of its operations on May 2, 2006. Delinquencies and early payment defaults on subprime mortgages began to rise markedly for many subprime mortgage orginator, including New Century, in the middle of 2006. Ownit Mortgage Solutions, the twentieth largest subprime mortgage originator in 2006, ceased operations on December 6, 2006.

[15] On the same day, HSBC Holdings PLC, the largest subprime mortgage originator, announced that its aggregate loan impairments and loss provisions would be about 20 percent above consensus analyst estimates due to deteriorating conditions in the U.S. housing market and increasing subprime mortgage delinquencies.

[16] New Century subsequently announced in a May 24, 2007 Form 8-K filing that this restatement would also involve the 2005 fiscal year and its valuation of retained residual securities. Missal (2008), the final report of New Century's bankruptcy court examiner, details various other accounting issues.

In this wave, the market as a whole woke up to the fact that subprime mortgage underwriting had been lax and losses on subprime mortgages likely would considerably exceed those previously expected by the market and accrued for by firms. This wave primarily affected subprime mortgage banks, many of whom stopped originating subprime mortgages, had large staff layoffs, or filed for bankruptcy in the following months. For example, in March 2007 New Century stopped originating mortgages because of margin calls and financing cutoffs by its lenders. Fremont General, the fifth largest subprime mortgage originator, also stopped originating subprime mortgages, and Ameriquest, the sixth largest originator, laid off about half its employees. On April 2, 2007, New Century filed for bankruptcy.[17] While this wave also affected some investors in junior CDO positions—such as two Bear Stearns' hedge funds into which Bear Stearns injected liquidity in June 2007 but that were valueless by July 2007—it did not have large repercussions for most investors in subprime-mortgage-related positions. This wave preceded the credit crunch by several months, as can be seen by the continuing decline in credit spreads through June 2007 depicted in Figure 2, Panel A.

The second wave hit and the credit crunch began in July and August 2007. No single event appears to have prompted the credit crunch. However, it clearly worsened as various investors in junior subprime positions announced losses on those positions and as various sponsors of ABCP and SIV securitizations announced the conduits could not roll over their short-term paper, thereby requiring the provision of liquidity support. Notably, on July 30 IKB Deutsche Industriebank (IKB) announced that it had to provide liquidity support to its Rhineland Funding SIV and that it also had experienced unspecified losses on its own investments in subprime-mortgage-related positions. With IKB clearly financially stressed, its primary investor

[17] The Mortgage Lender Implode-O-Meter™ at http://ml-implode.com/ lists subprime mortgage lenders and other firms significantly adversely affected by the subprime crisis.

assumed IKB's liquidity support obligation to the SIV as well as some of the credit losses on its investments. Also notably, BNP Paribas announced on August 9 that it could not reliably value its portfolio due to market illiquidity.

This wave primarily affected investors in or guarantors of junior subprime positions. For example, as depicted in Figure 4, Markit's ABX-HE-BBB 06-2 index—which is based on credit derivatives referenced to twenty BBB-rated ABS primarily collateralized by subprime home equity mortgages originated in the second half of 2006—implied a value for the underlying junior ABS of about 80% of par on July 9 that deteriorated significantly to about 43% of par on August 20.[18] In contrast, as depicted in Figure 5, Markit's ABX-HE-AAA 06-2 index—which is based on credit derivatives referenced to twenty AAA-rated ABS of the same vintage—implied a value for the underlying senior ABS of about 99% of par on July 9 that deteriorated only slightly to about 93% of par on August 20. Also indicating the greater effect of this wave on more junior positions, inspection of Figure 2, Panel B indicates that during July and August 2007 credit spreads rose considerably more in both absolute and proportionate terms for CCC-rated high-yield bonds than for less credit risky BB-rated high-yield bonds.

The third wave hit and the credit crunch intensified in October and November 2007. Notable events in this wave are the announcements of large and rapidly escalating losses on subprime positions by several large financial institutions holding super senior CDOs. For example, Merrill Lynch announced a $4.5 billion loss on subprime positions, not mentioning super seniors, in its October 5, 2007 Form 8-K filing. It revised that amount upward to a $7.9 billion loss in its October 24, 2007 Form 8-K filing, with $5.8 billion for super seniors. Citigroup reported a $1.8 billion loss on subprime positions in its November 5 Form 10-Q filing, $.5 billion of which was for super senior CDOs. It included a subsequent event disclosure of an estimated

[18] See www.markit.com.

additional $8-11 billion loss on subprime positions for events occurring after the end of the quarter on September 30. Most of this estimated loss appears to have been for super seniors, which constituted $43 billion of Citigroup's $55 billion subprime exposure.

This wave substantially affected investors in or guarantors of senior subprime positions for the first time and it further affected investors in or guarantors of junior subprime positions. For example, as depicted in Figures 5, Markit's ABX-HE-AAA 06-2 index implied a value for the underlying senior ABS of about 96% of par on October 1 that deteriorated to about 80% of par on November 25. As depicted in Figure 4, its ABX-HE-BBB 06-2 index implied a value for the underlying relatively junior ABS of about 39% of par on July 9 that deteriorated to about 20% of par on August 20. Also indicating the greater effect of this wave on more senior positions, inspection of Figure 2, Panel B indicates that credit spreads rose considerably more proportionately for BB-rated high-yield bonds than for CCC-rated high-yield bonds during October and November 2007.

The fourth wave hit and the credit crunch moved well beyond subprime-related positions in late-January/March 2008. Notable events in this wave are the major bond insurers reporting losses on written credit derivatives guaranteeing subprime-mortgage-backed CDOs. In its January 22, 2008 Form 8-K filing, AMBAC announced a $5.2 billion loss on these derivatives. In its January 31, 2008 Form 8-K filing, MBIA announced a $3.5 billion loss. These losses, while directly related to subprime positions, raised deep concerns about contagion to other positions, because the bond insurers guarantee about $2 trillion of municipal, asset-backed, and other debt. In addition, around this time commercial banks announced significantly increased provisions for credit card and other consumer loans for the fourth quarter of 2007. At the end of February, Fannie Mae and Freddie Mac announced large losses on their credit guarantees and

repurchases of defaulted securitized mortgages. By now, the credit crisis has significantly deteriorated the financing ability of all but the most highly rated corporate, municipal, and consumer credits. Credit spreads continue to rise, and the average spread on high-yield bonds has tripled from 2.53% in June 2007 to 7.66% in March 2008.

On March 16, 2008, JPMorgan Chase agreed to purchase Bear Stearns for $2/share after the Federal Reserve agreed to guarantee $30 billion of Bear's illiquid positions. Responding to the discontent of Bear's shareholders (many of whom are also employees), although in the absence of any obvious potential alternative bidders, JPMorgan Chase quickly upped its offer to $10/share. Whether this presages a new wave of the crisis in which interventions by the Federal Reserve or other governmental bodies play central roles remains to be seen, but it seems reasonably likely.[19]

III. FAIR VALUE ACCOUNTING AND DISCLOSURES

As discussed above, specific accounting standards govern the accounting for the different types of subprime positions. While these standards employ various valuation attributes, fair value is by far the most important of these attributes, especially regarding the recognition of losses. The measurement of the fair value of subprime positions currently involves significant practical difficulties, due to high and increasing market illiquidity that has developed during the subprime crisis. In this section, I discuss the application of fair value accounting for subprime positions and both required and additional desirable disclosures regarding the fair values of those positions.

[19] At the end of March 2008, Treasury Secretary Henry Paulson circulated a proposal to drastically revamp financial regulation. One aspect of that proposal is to expand the Federal Reserve's power to supervise the overall financial system.

Scope of Fair Value Accounting

As depicted in Figure 6, the valuation attributes required by the accounting standards governing the accounting for subprime positions can be subdivided into the following broad categories. Some of these standards require or allow subprime positions to be fair valued on the balance sheet (e.g., FAS 115 for trading and AFS securities, FAS 133 for derivatives, FIN 45 for guarantees at inception, and FAS 159 for positions for which the fair value option is chosen). When fair value is the valuation attribute, unrealized gains on the positions may be recorded either on the income statement (e.g., FAS 115 for trading securities, FAS 133 for nonhedge and fair value hedge derivatives, and FAS 159 for financial instruments for which the fair value option is elected) or in other comprehensive income (FAS 115 for AFS securities and FAS 133 for cash flow hedge derivatives).

Other of these standards require subprime positions to be recorded at amortized cost (possibly zero) on the balance sheet. Assets accounted for at amortized cost generally are subject to impairment write-downs if criteria specified in the standards are met. Assets deemed impaired based on the relevant criteria are required to be written down to fair value under some standards (e.g., FAS 115 for HTM securities and SOP 01-6 for held-for-sale loans) and to other valuation attributes that generally are higher than fair value under other standards (e.g., FAS 5 and FAS 114 for held-for-investment loans). Similarly, under FAS 115 unrealized gains and losses on AFS securities that previously were recorded in other comprehensive income are recorded in income when the AFS are deemed impaired.

Critical Aspects of the Definition of Fair Value

FAS 157 defines fair value as "the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date." In this section, I unpack and discuss the constituent elements of this definition, indicating the practical difficulties involved in applying each element and the slippage among the elements given the current market illiquidity for subprime positions.

The definition reflects an optimal "exit value" notion of fair value, that is, the highest values of assets and the lowest values of liabilities currently held by the firm. This notion corresponds to firms' solvency more than do the possible alternative fair value notions of "entry value" (the price that would be paid to buy an asset or received from issuing a liability) or "value in use" (the entity-specific value to the current holder of an item). In particular, if all assets and liabilities on a firm's balance sheet were perfectly measured at exit value, then owners' equity would equal the cash expected to remain if the firm liquidated all of those items in orderly transactions between market participants at the measurement date, that is, not in fire sales. Given the paramount importance of maintaining solvency during the subprime crisis, this element of the definition of fair value is well suited to users of financial reports' current informational needs.

"At the measurement date" means that fair value should reflect the conditions that exist at the balance sheet date. If markets are illiquid and credit spreads are at historically high levels, as is now the case, then the fair values of should reflect those conditions. In particular, firms should not incorporate their expectations of market liquidity and credit spreads returning to normal over some horizon, regardless of what historical experience, statistical models, or expert opinion indicates. While one can question this element of the fair value definition, it has considerable precedent in the accounting literature—notably FAS 107, *Disclosures about Fair*

Value of Financial Instruments, and SEC enforcement actions—[20] and it is hard to imagine the FASB proposing a definition of fair value without it.

An "orderly transaction" is one that is unforced and unhurried. The firm is expected to conduct usual and customary marketing activities to identify potential purchasers of assets and assumers of liabilities, and these parties are expected to conduct usual and customary due diligence. Each of these activities could take months in the current environment, because of the few and noisy signals about the values of subprime positions currently being generated by market transactions and because of parties' natural skepticism regarding those values. Hence, the earliest such an orderly transaction might occur could easily be a quarter or more after the balance sheet date. At that time, market conditions almost certainly will differ from those that exist at the balance sheet date, for better or, as been the case lately, worse.

Together, the "at the measurement date" and "orderly transaction" elements of the fair value definition require the estimation of the price at which a hypothetical transaction occurring at a future date based on current information and market conditions. While I guess one can conceive of such transactions in thought experiments, they logically do not occur, and they become conceptually and practically more problematic as a basis for the accounting the greater is market illiquidity. Conceptually, the exit value notion in the fair value definition becomes muddier when exit values are less certain to be realizable through actual orderly transactions. Practically, firms that want to solicit actual market participants for bids to help determine the fair values of subprime positions cannot do so when the time required exceeds that between the balance sheet and financial report filing dates. Moreover, any bids that market participants might provide naturally would reflect market conditions at the expected transaction date, not the

[20] For example, see United States Securities and Exchange Commission (2004).

balance sheet date. In my opinion, the orderly transaction element of the fair value definition is, as a practical matter, trumped by the at the measurement date element in dramatically illiquid markets such as we currently are experiencing.

"Market participants" are knowledgeable, unrelated, and willing and able to transact. Knowledgeable parties are not just generally sophisticated and aware of market conditions, but have conducted the aforementioned due diligence and ascertained as best as possible the fair value of the subprime position under consideration. FAS 157 presumes that, after conducting these activities, either market participants are as knowledgeable as the firm currently holding the position or that any remaining information asymmetry can be priced. The standard really does not contemplate the idea that information asymmetry between the current holder of a position and a potential purchaser or assumer of the position is so severe that markets break down altogether, as it has for many subprime positions.

The Fair Value Hierarchy

FAS 157 creates a hierarchy of inputs into fair value measurements, from most to least reliable. Level 1 inputs are unadjusted quoted market prices in active markets for identical items. While some accounting academics, bank regulators, and others worry that market values might be incorrect or their use in accounting might have undesirable incentive or feedback effects, in my opinion pure mark-to-market measurements using such maximally reliable inputs are the rough equivalent of accounting nirvana. Even in times of normal market liquidity, this nirvana does not exist for most subprime positions, however, and so I can safely ignore such philosophical disputes in this essay.

Level 2 inputs are other directly or indirectly observable market data. There are two broad subclasses of these inputs. The first and generally preferable subclass is quoted market prices in active markets for similar items or in inactive markets for identical items. These inputs yield adjusted mark-to-market measurements that are less than ideal but usually still pretty good, depending on the nature and magnitude of the required adjustments. The second subclass is other observable inputs such as yield curves, exchange rates, empirical correlations, et cetera. These inputs yield mark-to-model measurements that are disciplined by market information but that can only be as good as the models employed. In my view, this second subclass usually has less in common with the first subclass than with better quality level 3 measurements described below.

In times of normal market liquidity, many subprime positions would be fair valued using level 2 measurements. For example, while most subprime MBS trade over-the-counter and rarely, in normal markets dealers generally do their best to provide bid and ask prices for these securities. There are also price and yield indices for portfolios of subprime positions available from Markit and other sources.[21] The price transparency offered by these sources has substantially evaporated during the subprime crisis, however. Dealers are reluctant to provide bid and ask quotes for subprime positions, and when they do the bid-ask spread is very wide. Very few truly orderly transactions are occurring, and those that do occur typically are privately negotiated principal-to-principal transactions for which the terms and positions involved are largely opaque to market participants. Markit has announced that there will be no indices for the first half of 2008 vintage, due to an insufficient number of securitizations.

Level 3 inputs are unobservable, firm-supplied estimates. While these inputs should reflect the assumptions that market participants would use, they yield mark-to-model valuations

[21] See Bond Market Association and American Securitization Forum (2006) for a list and description of these sources.

that are largely undisciplined by market information. Due to the declining price transparency described above, many subprime positions that previously were fair valued using level 2 inputs must now be fair valued using level 3 inputs. While many firms have been criticized in the popular press for this migration of fair value measurements down the hierarchy, this migration is an inevitable result of the deterioration of price transparency in the subprime crisis.

Level 3 inputs usually are based on historical data in some fashion. Historical data is only useful for fair valuation purposes to the extent that the future is expected to be similar, or at least capable of being related, to the past. For subprime positions, a critical level 3 input is house price depreciation. Most of the historical data to date (and a fortiori up to earlier points in the subprime crisis) reflect a period in which house price appreciation was robust and so defaults were few, uncorrelated, and yielded small percentage losses given default. Hence, this historical data is of little use for the purposes of determining this input and thus the fair values of subprime positions. Instead, firms must forecast future house price depreciation, as well as other primitive variables such as future interest rates and the time when subprime mortgagors will be able to refinance again. These variables are critical determinants of the future number and correlation of defaults and the percentage magnitude of losses given default.

Needless to say, such forecasts are very difficult to make. For example, in late 2007 reasonable firms could have forecast real house prices declining by a relatively modest amount such as 10%, declining gradually by say 25% to an interest-rate-adjusted historical trend line, declining sharply to that trend line, overshooting the trend line by a significant amount, or following any number of other paths. While the first of these options is now off the table, considerable uncertainty remains. The fact is, nobody really knows where house price depreciation will end up or how it will get there.

Various other level 3 inputs are important in the valuation of subprime positions but are hard to estimate. For example, the discount rate (riskless rate plus credit spread) is a critical input into the valuation of originators and securitizers' retained equity tranches and other residual securities. Because these positions trade only very rarely, this discount rate invariably is an internal estimate. In a May 24, 2007 Form 8-K filing, New Century reports that it misvalued its retained residual securities, apparently because of the use of a too low discount rate.

While level 3 fair values have the aspects described above, given the poor quality signals being generated in the current illiquid markets, I suspect well-disclosed level 3 values would be more informative to users of financial reports than level 2 fair values. This suspicion implies testable hypotheses that I discuss in Section V.

Required Disclosures

Subprime positions are subject to the disclosure requirements of the governing accounting standards (e.g., FAS 115 for securities) that I do not mention here.[22] Instead, I discuss three overarching disclosure requirements of particular relevance to subprime positions during the subprime crisis.

First, FAS 157 requires disclosures of fair value measurements by level of the hierarchy. The required disclosures are considerably more detailed for level 3 fair value measurements than for level 1 or 2 measurements. In particular, for level 3 measurements firms most provide quantitative reconciliations of beginning and end-of period fair values, distinguishing total (realized and unrealized) gains and losses from net purchases, sales, issuances, settlements, and transfers. The line-item location of gains and losses on the income statement must be indicated. Qualitative descriptions of measurement inputs and valuation techniques must be provided.

[22] See Ryan (2007) for detailed discussion of these required disclosures.

These disclosure requirements make the effects of level 3 measurements on the financial statements considerably more transparent than they would have been under prior GAAP, and users of financial reports are fortunate to have them available during the subprime crisis.

Second, SOP 94-6, *Disclosure of Certain Significant Risks and Uncertainties*, requires disclosures regarding an uncertain estimate such as a fair value when it is reasonably possible the estimate will change in the near term (one year or less) and the effect of the change would be material to the financial statements. The disclosure should indicate the nature of the uncertainty. Disclosures of the factors that cause the estimate to be sensitive to change are encouraged but not required.

Neither FAS 157 nor SOP 94-6 requires quantitative disclosures of the forecasted values of the primitive variables that underlie level 3 fair valuations or of the sensitivities of the fair valuations to movements in those primitive variables. In the absence of such quantitative disclosures, during the subprime crisis I have found level 3 fair values to be very difficult to interpret for a given firm and to compare across firms. To enhance the interpretability of level 3 fair values, I suggest the FASB consider requiring disclosures of firms' forecasts of primitive variables when those forecasts have material effects on their level 3 fair valuations.

Third, SAS 1 requires disclosures of type 2 subsequent events, i.e., events that occur between the balance sheet date and the financial report filing date, if these events render the financial statements misleading as of the filing date. Very significant type 2 subsequent events occurred for many firms holding large subprime positions in the third and fourth quarters of 2007. Specifically, the third and fourth waves of the subprime crisis described above hit after the end of the third and fourth fiscal quarters of many firms, respectively, but before the filing dates

for those quarters. Citigroup's previously discussed third quarter 2007 subsequent events disclosure is a good example.

Fair Value Option

FAS 159 allows firms to elect to fair value individual financial instruments upon the adoption of the standard or at the inception of the instruments. One type of exercise of the fair value option with particular salience in the subprime crisis is the decision by many securities firms to fair value the liabilities of their consolidated securitization entities. Securities firms have made this choice primarily because they are required by industry or other GAAP to record the entities' assets at fair value, and so electing the fair value option for the entities' liabilities yields symmetric accounting. In general, such symmetry is a desirable thing, as offsetting gains and losses on these economically matched positions are recorded in the same period.

A concern, however, is that these firms may have the incentive to provide moral recourse to the securitization entities. When this is the case, the firms may bear the losses on the entities' assets without benefiting from offsetting gains on the entities' liabilities. At a minimum, the fair values of the entities' liabilities would have to be adjusted for any expected provision of moral recourse, a problematic valuation exercise given the noncontractual nature of moral recourse.

IV. ACCOUNTING FOR SECURITIZATIONS AND RELATED ENTITIES

Securitizations

Two issues have arisen during the subprime crisis regarding firms' accounting for securitizations. First, FAS 140 allows sale accounting for securitizations of financial assets only if issuers surrender legal and effective control over the assets, as defined in paragraph 9 of the

standard. Courts in Ohio and elsewhere have recently ruled that issuers' assignments of mortgages to securitization entities may have been deficient because the entities' trustees or servicers did not (and perhaps cannot) prove the entities have legal standing to foreclose on the mortgaged properties.[23] I suspect this problem results in part from firms' haste in conducting securitizations due to the high volume of mortgage originations in recent years.[24] Since conforming mortgage securitizations are highly standardized, this problem is considerably more likely to arise for prime nonconforming, Alt-A, and subprime mortgage securitizations. These court rulings suggest that many mortgage securitizations that were accounted for as sales did not meet FAS 140's surrender of control requirement. Specifically, if a securitization entity does not have the legal standing to foreclose on a mortgage, then the securitization issuer probably does. The retention of this right by issuers would be inconsistent with them surrendering both legal and effective control over the securitized assets, as required by paragraph 9 of FAS 140.

Second, for both political and business reasons, securitization issuers, trustees, and servicers now want to modify the terms of large numbers of subprime mortgages that are entirely current with respect to interest and principal payments and for which no significant adverse mortgagor-specific event (e.g., serious illness or bankruptcy) has occurred. Mortgage modifications this proactive would be highly unusual—I have never heard of one occurring prior to the subprime crisis—and modifications on such an enormous scale by non-governmental

[23] The most notable of these are 14 foreclosure cases brought by plaintiff Deutsche Bank in its role as securitization entity trustee. Judge Christopher A. Boyko, United States District Court, Northern District of Ohio, Eastern Division, dismissed the cases without prejudice on October 31, 2007. Judge Boyko concluded that Deutsche Bank did not provide evidence that the securitization entity owned the mortgages. Whether Deutsche Bank is able to provide such evidence remains unclear. See http://www.suijuris.net/forum/asset-protection-estate-planning/13728-boyko-deutsche-bank-opinion.html.

[24] It also results in part from lawyers' haste in filing foreclosure claims, a correctable problem.

parties would be unprecedented. For example, during the Great Depression, the federal government, not mortgage lenders, effected most mortgage modifications.[25]

The question has arisen whether mortgages can be modified in this fashion while still retaining the qualifying SPE (QSPE) status of securitization entities. Under paragraph 46 of FAS 140, QSPEs are immune from consolidation by the issuer. Hence, for securitizations that qualify for sale accounting, a QSPE securitization entity ensures the securitized assets and associated debt stay off the issuer's books. In contrast, if the securitization entity is not a QSPE, then an issuer that retains a sufficiently large first-loss interest will have to consolidate the entity under FIN 46(R).

FAS 140, paragraph 35b, allows servicers of mortgages held by QSPEs to exercise discretion over mortgage modifications while retaining QSPE status only when that discretion is "significantly limited" and "entirely specified" in the QSPEs' charters or contracts. This requirement is expanded on in Q&A 28B of the FAS 140 implementation guide.

In a July 18, 2007 memo[26] and January 8, 2008 letter,[27] Conrad Hewitt, the Chief Accountant of the SEC, allowed mortgages held by QSPEs to be modified without jeopardizing QSPE status if default is "reasonably foreseeable" as defined very broadly by the American Securitization Forum in a June 2007 statement.[28] Mr. Hewitt explains this decision as pertaining

[25] Specifically, the Home Owners' Loan Act of 1933 created the Home Owners' Loan Corporation (HOLC). HOLC acquired defaulted mortgages from banks in exchange for its bonds. HOLC modified the terms of the mortgages to a level the borrowers could afford. The bonds paid about half the interest rate (2.5%) of the modified mortgages (a maximum of 5%). During its life, HOLC modified the terms of approximately one million mortgages, one-fifth of the mortgages in the United States.

[26] http://www.house.gov/apps/list/press/financialsvcs_dem/sec_response072507.pdf

[27] http://www.sec.gov/info/accountants/staffletters/hanish010808.pdf

[28] Specifically, the American Securitization Forum's (2007) definition of reasonably foreseeable is:

> "The modification standard 'default is reasonably foreseeable' should be deemed to be met where there has been direct contact between the servicer and the borrower, where the servicer has evaluated the current ability to pay of the borrower, and has a reasonable basis for determining that the borrower is unlikely to be able to make scheduled payments on the loan in the foreseeable future. (This interpretation is intended to provide guidance only as to a set of circumstances where the standard would generally be viewed to be met, and not to reflect any view that the standard would not be met in other circumstances.)"

to “one practice issue” in applying a “complicated” standard. In my opinion, however, he provided an exemption to FAS 140’s requirements regarding QSPEs and servicer discretion. Mortgage modification in such a wholesale and proactive fashion cannot reasonably be viewed as significantly limited. I also seriously doubt that the modification of entirely current mortgages for which no significant adverse mortgagor-specific event has occurred is even contemplated, not to mention entirely specified, in QSPEs’ charters or contracts. If it were, why did the American Securitization Forum have to interpret “reasonably foreseeable” in its June 2007 statement? While it may be a good thing given current circumstances to provide securitization issuers, trustees, and servicers with incentives to modify large amounts of subprime mortgages, and the SEC (although not its Chief Accountant) has the right to write new or modify existing accounting standards, I think Mr. Hewitt should have indicated he was providing an exemption to rather than interpreting FAS 140.

The desire to modify the terms of subprime mortgages, supposedly passive financial assets, held by QSPEs raises the question of whether the notion of a QSPE should be eliminated. The FASB is currently considering this question.

Consolidation of Securitization Entities

The subprime crisis has raised several issues regarding consolidation of securitization entities. To be able to state these issues clearly, I first describe the relevant aspects of FIN 46(R), the rule that governs consolidation of variable interest entities (VIEs). VIEs include virtually all securitization entities, although FIN 46(R) exempts QSPEs from consolidation by the issuer and in most cases other parties, and so only non-QSPE entities are subject to consolidation.

VIEs are entities whose equity ownership either is insufficient to finance their operations or does not involve the usual control rights or financial interest associated with equity. Because of the insignificance of their equity ownership, consolidation of VIEs is based instead on parties' holdings of variable interests—contractual, ownership, or other pecuniary interests in an entity that change with changes in the fair value of the entity's net assets exclusive of variable interests. Examples of variable interests are equity and debt securities, profit and revenue sharing agreements, and financial guarantees. As indicated in paragraph B10 of FIN 46(R) and in FSP FIN 46(R)-5, *Implicit Variable Interests under FASB Interpretation No. 46 (revised December 2003),* variable interests may be implicit, that is, arise from parties' economic incentives.[29] For example, the incentive to provide moral recourse to a securitization entity may be an implicit variable interest. A party that holds variable interests that bear more than half of the expected losses or expected residual returns of the VIE's net assets exclusive of variable interests, referred to as the primary beneficiary, must consolidate the VIE.

The decision as to which party, if any, is the primary beneficiary of a VIE is made at the inception of the entity and at subsequent reconsideration events defined in paragraph 15 of FIN 46(R). Reconsideration events differ for the primary beneficiary and for other parties. For the primary beneficiary, reconsideration events occur when it disposes of its variable interests to unrelated parties or when the VIE issues new beneficial interests to parties other than the primary beneficiary or its related parties. For other parties, reconsideration events occur when these parties acquire additional variable interests in the VIE.

The subprime crisis has caused many firms to dispose of or to acquire subprime positions that are variable interests in VIEs. Due to these reshufflings of variable interests, it is considerably more likely than usual that the primary beneficiaries of VIEs have changed.

[29] For example, see the example in FSP FIN 46(R)-5.

Two types of events have occurred with some frequency during the crisis, for which it is unclear whether they constitute reconsideration events or not. The first type involves parties that provide contractually required liquidity support to ABCP and SIV securitization conduits. Liquidity support may be a variable interest depending on its terms. At the inception of an ACBP or SIV securitization, a party that only provides liquidity support to the conduit is unlikely to be its primary beneficiary. This is partly because the provision of liquidity support is a low probability event and partly because liquidity support usually is provided on market terms at the time of provision. If the conduit cannot roll over its asset-backed securities, the provider of liquidity support may be contractually required to buy those securities, which are variable interests. The question is whether the required purchase of the securities constitutes the acquisition of new variable interests, which would be a reconsideration event, or the fulfillment of existing variable interests, which would not. Logically, the provider of contractual liquidity support is in an economically identical position one second before it provides the required liquidity support and one second afterwards. Reflecting this logic, my view is that the contractually required provision of liquidity support is not a reconsideration event, although FIN 46(R)'s language certainly can be read the other way.

The second type of event is one that changes a party's economic incentives and thereby changes the significance of the party's implicit variable interests in a VIE. For example, an issuer in a securitization may have incentives to provide moral recourse under certain conditions. At the inception of the securitization, those conditions generally are expected to occur with a very low probability, and so the issuer is unlikely to be the primary beneficiary of the securitization entity at that time. The probability that the issuer will provide moral recourse rises as market illiquidity rises, however. The question arises whether this market illiquidity constitutes a reconsideration

event. My view is it does not, because paragraph 7 of FIN 46(R) clearly states that the realization of bad luck is not a reconsideration event. However, the noncontractual nature of implicit variable interests and the lack of specific language in FIN 46(R) regarding reconsideration events for implicit variable interests make it difficult to know what, if anything, could constitute a reconsideration event for those interests.

I recommend the FASB consider clarifying whether and when these two types of events are reconsideration events.

V. IMPLICATIONS FOR ACCOUNTING RESEARCH AND TEACHING

As discussed above, the subprime crisis constitutes a signal researchable-teachable moment. It raises significant questions about the applicability of FAS 157's fair value measurement guidance in illiquid markets, about sale accounting for securitizations and QSPE status for securitization entities when the securitized assets may need to be actively managed under FAS 140, and about consolidation of non-QSPE entities under FIN 46(R). It also raises significant questions about how preparers of financial statements have applied this guidance in practice, and about users of financial reports' ability to make investment and other decisions based on financial report and other information. In this section, I indicate avenues along which accounting academics can address these questions in our research and teaching.

To keep the length of this section manageable, I focus on two big-picture issues for which the subprime crisis can either provide the data for sharply focused empirical-archival research or directly motivate experimental-behavioral research. I view the two research approaches as highly complementary ways to address these issues for two main reasons. First, many of the issues will be difficult to address using empirical-archival methods because of lack of data availability or

selection/control problems, but amenable to experimental-behavioral research. I indicate below where this is likely to be the case. Second, many of the issues also raise psychological issues that previously have been primarily addressed using experimental-behavioral methods. As it is outside of my expertise, I do not discuss psychological issues and related research opportunities, although I note that Koonce and Mercer (2005) argue that psychological theories can also motivate empirical-archival research.

I also think there is much to be learned about these issues from careful analysis of cases examining an individual firm's financial reporting decisions. We are considerably more likely to know an individual firm's exposures (after hedging) to subprime positions than to be able to control for differences in these exposures across firms in empirical-archival analysis. Using a not-too-hypothetical case, I indicate how these issues can be made salient in the classroom.

Lead-Lag Properties of Fair Value Measurements in Illiquid Markets

The first issue is whether and to what extent firms' reported fair value losses for subprime positions have reflected the worsening of market signals up to the balance sheet date versus increased the adverseness of future market signals. As noted above, some parties have tried to pin the blame for the subprime crisis on fair value accounting, basically arguing that firms reporting fair value losses on subprime positions has led to avoidable market panic and illiquidity that has yielded further losses that do not reflect the expected payoffs on these positions. While in my opinion this position is untenable—such adverse feedback effects largely being the unavoidable consequence of a severely shocked price discovery process and extremely high uncertainty—in principle this position implies a set of hypotheses that are amenable to test.

In particular, we can empirically test whether and to what extent reported fair values have reacted to versus driven movements in observable (e.g, Markit's) market indices, both of which may have occurred to some extent. One way to do this would be to estimate a "reverse" regression of reported fair value losses on lagged and lead changes in market indices. Significant positive coefficients on lagged changes in market indices would be consistent with fair values summarizing prior market information. In contrast, significant positive coefficients on lead changes in market indices would be consistent with feedback effects. Such feedback effects are not necessarily undesirable, however, as they could simply accelerate losses that would have eventually occurred anyways. Hence, to deem feedback effects undesirable, we would also have to find that changes in the market indices around the announcement of losses subsequently reverse. As I suspect it will be difficult to devise powerful and interpretable tests of reversals of market indices even if they exist, this question is likely to be more fruitfully addressed through experimental-behavioral research.[30]

We could also conduct similar tests using indicators of market illiquidity (e.g., high bid-ask spread and low trading volume) in the place of market indices to determine whether and to what extent reported fair values have reacted to versus driven market illiquidity, both of which may have occurred. Since most subprime positions trade over-the-counter and these markets have almost entirely broken down, I again suspect that this question is likely to be more powerfully addressed through experimental-behavioral research. If we find evidence of such feedback effects with respect to market illiquidity, then we could then investigate whether this

[30] Bloomfield, Nelson, and Smith (2006) is an experimental-behavioral study that research that finds feedback effects resulting from a particular misuse by investors of unrealized fair value gains and losses recorded in accumulated other comprehensive income. These feedback effects are of an entirely different nature from those that appear to have occurred in the subprime crisis.

illiquidity is an inevitable result of a price discovery process amid high levels of uncertainty or somehow attributable to fair value accounting.

The above analyses could be refined in the following two ways. First, we could test whether the lead-lag properties of reported losses differ for level 2 measurements estimated using the poor quality but observable market signals currently being generated and for level 3 measurements estimated using unobservable firm supplied inputs. Second, we could test whether the properties of level 3 measurements change if the estimates of the primitive variables underlying the measurements and the sensitivity of the measurements to those variables are disclosed.

Causes of and Cures for Opacity

The second issue is whether and how firms' economic leverage and risk arising from off-balance sheet subprime positions (e.g., the sold tranches of subprime mortgage securitizations accounted for as sales) and on-balance sheet but concentrated-risk subprime positions (e.g., retained junior tranches or credit derivatives) are assessable from their financial reports and other observable information. As noted above, the opacity of firms' subprime positions is a likely reason for the feedback effects that appear to have occurred as firms reported fair value losses on those positions.

To address this issue, which is largely unexplored in accounting research, researchers will need to determine both the causes and cures of the opacity of subprime positions. Some clues about what causes opacity are provided by two recent studies examining banks' loan securitizations, for which relatively detailed (though by no means complete) and standardized information is provided in banks' regulatory filings. Chen, Liu, and Ryan (2008) find that

attributes of these securitizations—most importantly, the retention of credit-enhancing interest-only strips—are significantly associated with banks' unsystematic risk. Cheng, Dhaliwal, and Neamtiu (2008) find that the magnitude of these loan securitizations is associated with three measures of banks' opacity: bid-ask spread, trading volume, and analyst forecast dispersion. These studies suggest that retained positions with highly concentrated risks and off-balance sheet positions are particularly likely to be opaque.

The obvious cure for opacity is fuller disclosure. This could involve requiring firms to identify their on- and off-balance sheet subprime positions, the economic attributes of positions such as risk concentration, and any hedging or other risk management of those positions. These disclosures are similar to those now required for derivatives under FAS 161, *Disclosures about Derivative Instruments and Hedging Activities—an amendment of FASB Statement No. 133.* It could also involve requiring firms to disclose the critical estimates underlying reported fair values and the sensitivity of those fair values to those estimates.

I think this issue is likely to be best addressed through experimental-behavioral research, for the following reasons. Empirical-archival researchers can address the effect of specific types of disclosures on opacity only to the extent that firms provide these disclosures. Potentially desirable disclosures may have been provided by few or no firms. Moreover, firms that enhance their disclosures often do so in the periods they report material fair value losses and/or make significant changes to their positions. As a consequence, empirical researchers likely will find it difficult to untangle the reduced opacity that comes from enhanced disclosures from the generally bad news those disclosures convey. In contrast, experimental-behavioral researchers can hold positions and news constant while manipulating disclosures to determine which types best cure opacity.

A Not-Too-Hypothetical Case

Assume the following facts. A large commercial bank has sponsored CDO resecuritizations of subprime MBS and retained only the super senior tranches, similar to Citigroup and Merrill Lynch. Moral recourse is not an issue. The bank is preparing its Form 10-Q filing for the third quarter of 2007, which requires it to estimate the fair value of those tranches as of the balance sheet date September 30, 2007. The bank also must consider making subsequent event disclosures indicating the approximate fair value of the tranches as of the filing date if this amount is materially different from the reported fair value.

The bank's filing date occurs after Citigroup and Merrill Lynch's filings on November 5 and 7, 2007, respectively, so it has the benefit of observing both these filings. Citigroup recorded a 1% loss on its super senior positions in the third quarter and provided a subsequent event disclosure indicating a further 22% loss on its total subprime positions (presumably the percentage loss on the super seniors was lower). Merrill Lynch recorded an 18% loss, indicating the percentage loss on super senior tranches was 8% for CDO securitizations collateralized by high-grade (roughly AA-rated) subprime MBS, 38% for CDO securitizations collateralized by mezzanine (roughly BBB-rated) subprime MBS, and 57% for CDO securitizations collateralized by other CDOs. Merrill Lynch did not include a related subsequent event disclosure in its filing. The bank is also generally aware that other firms, such as AMBAC and MBIA, have significant exposures to senior CDO positions but have not yet recorded or announced losses.

In addition to this information, the bank observes Markit's ABX-HE-BBB 06-2 and ABX-HE-AAA 06-2 indices depicted in Figures 4 and 5. The BBB (AAA) index corresponds roughly to the value of the collateral underlying super senior CDOs collateralized by mezzanine

(high-grade) subprime MBS. The bank is generally aware that these indices have been driven down by very large bid-ask spreads for the credit derivatives underlying the indices. Half of the bank's super senior tranches are backed by each of high-grade and mezzanine subprime MBS. The bank believes that almost all of the value of the collateral will accrue to the benefit of the super senior tranches (i.e., the other tranches of the CDO securitizations are basically worthless). The face value of each super senior tranche is 75% of the face value of the underlying subprime MBS collateral.

The bank's also estimates its own level 3 fair values for its super senior tranches, for which the critical input is house price depreciation. It assigns the following probabilities to five possible levels of house price depreciation and associated percentage losses on its holdings of super senior CDOs.

house price depreciation	*estimated percentage loss*	*probability occurs*
10%	0%	20%
15%	5%	40%
20%	20%	25%
25%	40%	10%
30%	80%	5%

Thus, the most likely (expected) percentage loss is 5% (15%).

The facts in this case afford many avenues for fruitful classroom discussion.

- What are the absolute and relative strengths and weaknesses of fair valuing the bank's super senior tranches using the following approaches:
    - the percentage losses recorded by Citigroup and Merrill Lynch
    - the Markit indices
    - its level 3 valuation model?

- Does FAS 157 allow the bank to use the level 3 valuation approach given the availability of imperfect level 2 inputs such as the Markit index? If so, what aspects of the facts in the case justify this?
- For each of the valuation approaches, what disclosures would make the approach most informative to users of financial reports?
- If the bank chooses the level 3 valuation approach, what factors should/might play into the bank's decision whether or not to voluntarily disclose the 80% loss that would result from 30% house price depreciation given the low assessed probability of that outcome?

VI. CONCLUDING REMARKS

Like all of the severe crises that have periodically beset our remarkably flexible economy, the subprime crisis is not and could not be the fault of any one set of parties. The entire economic ecosystem failed to appreciate the risks of the rapid growth in risk-layered subprime mortgages, the inevitable end of house price appreciation, and unprecedented global market liquidity. These factors combined to enable all-too-human undisciplined behaviors in lenders, borrowers, and investors, all of whom were unquestioningly optimistic for as long as the sun shined upon home equity. Economic policy, bank regulation, corporate governance, financial reporting, common sense, fear of debt and bankruptcy, and all of our other protective mechanisms were insufficient to curb these behaviors. The process played out exactly as Keynes (1936) described the behaviors underlying upswings in economic cycles.

> "Even apart from the instability due to speculation, there is the instability due to the characteristic of human nature that a large proportion of our positive activities depend on spontaneous optimism rather than mathematical expectations, whether moral or hedonistic or

> economic. Most, probably, of our decisions to do something positive, the full consequences of which will be drawn out over many days to come, can only be taken as the result of animal spirits - a spontaneous urge to action rather than inaction, and not as the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities."

This passage also captures how divorced the process was from the economic and statistical concepts, such as fair value, that underlie accounting.

Accounting, fair value or otherwise, will never eliminate such behaviors. It can only play two roles. It can provide periodic financial reports that inform relatively rational and knowledgeable market participants on an ongoing basis, thereby mitigating the adverse effects of these behaviors. It can provide a common information set upon which market participants can recalibrate their valuations and risk assessments when the economic cycle turns. In my view, fair value accounting plays an essential part in both of these roles, but especially in allowing such recalibrations to occur as quickly and efficiently as possible, as it is now doing in the subprime crisis. By comparison, any form of historical cost accounting would drag out these recalibrations over considerably longer period, likely worsening the ultimate economic cost of the crisis.

This is not to say that fair value accounting and other aspects of GAAP have worked perfectly during the subprime crisis. The crisis has made clear that financial statement preparers need additional guidance regarding how to calculate fair values in illiquid markets. Users of financial reports need better disclosures about the critical estimates underlying level 3 fair values and how sensitive fair values are to those estimates. Accounting standard setters need to consider what guidance and disclosures to require. Preparers need to provide these disclosures in an informative fashion, and users must analyze them carefully and dispassionately. Accounting researchers and teachers can contribute to all of these processes. Indeed, for all of us who care about accounting and its role in our economy, there is much work to be done.

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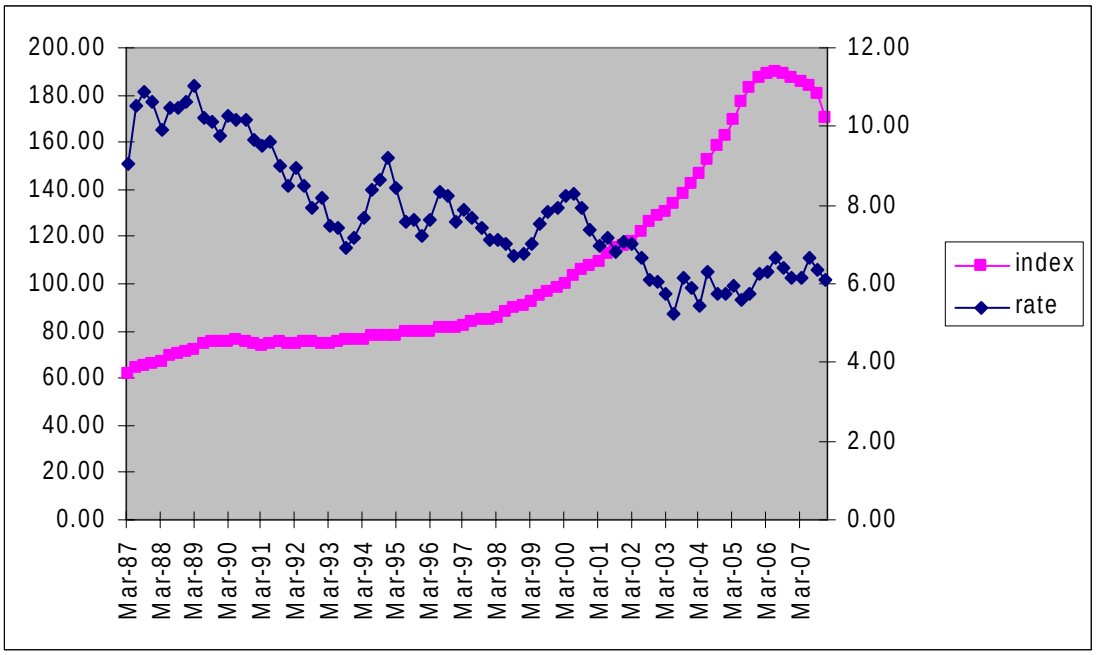
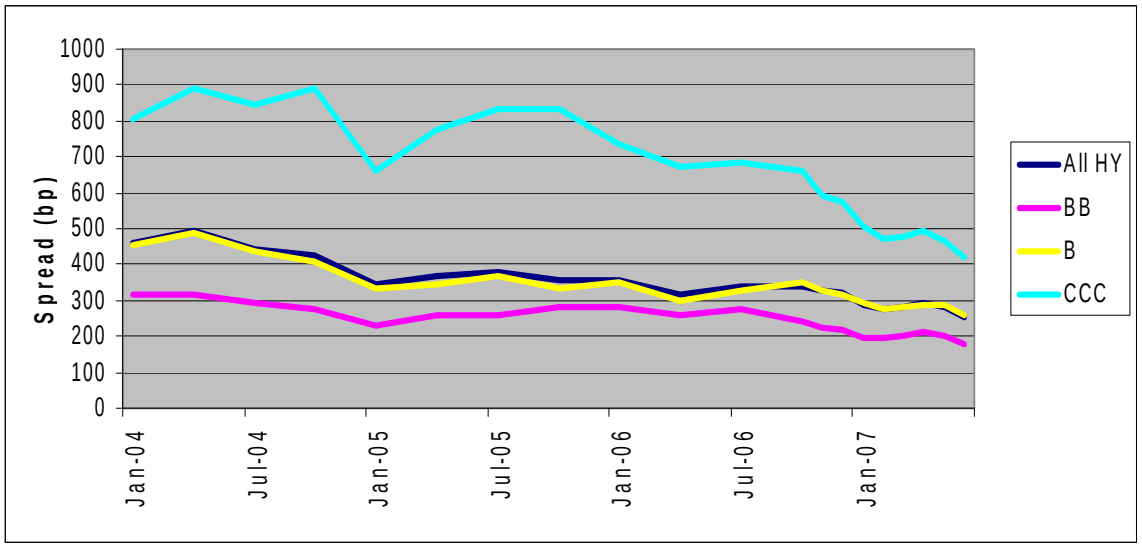
FIGURE 1
S&P/Case-Shiller National House Price Index
Freddie Mac 30-Year Fixed-Rate Mortgage Commitment Rate
March 1987-December 2007



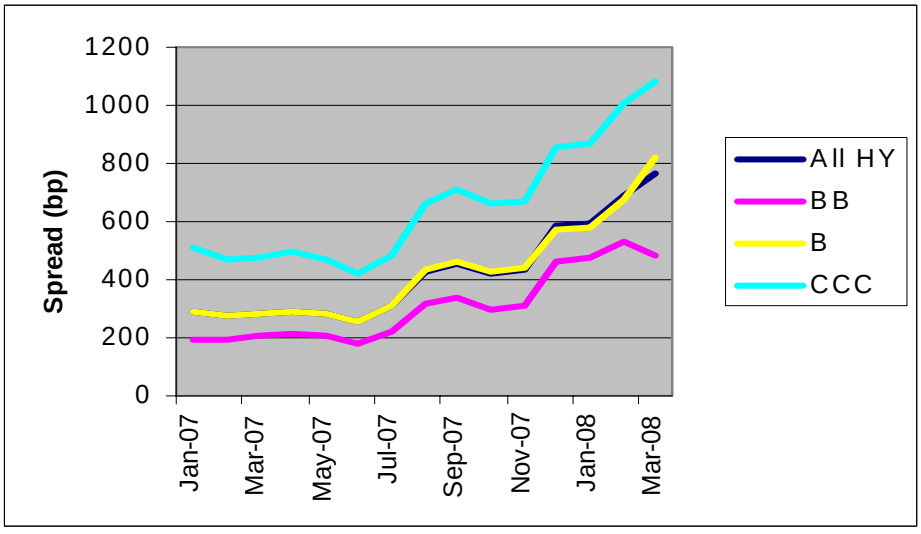
Sources: http://www.macromarkets.com/csi_housing/sp_caseshiller.asp
http://www.freddiemac.com/dlink/html/PMMS/display/PMMSOutputYr.jsp?year=2008

FIGURE 2
Citigroup YieldBook High-Yield Corporate Bond Credit Spreads over Treasuries
January 2004-March 2008

Panel A: January 2004-June 2007

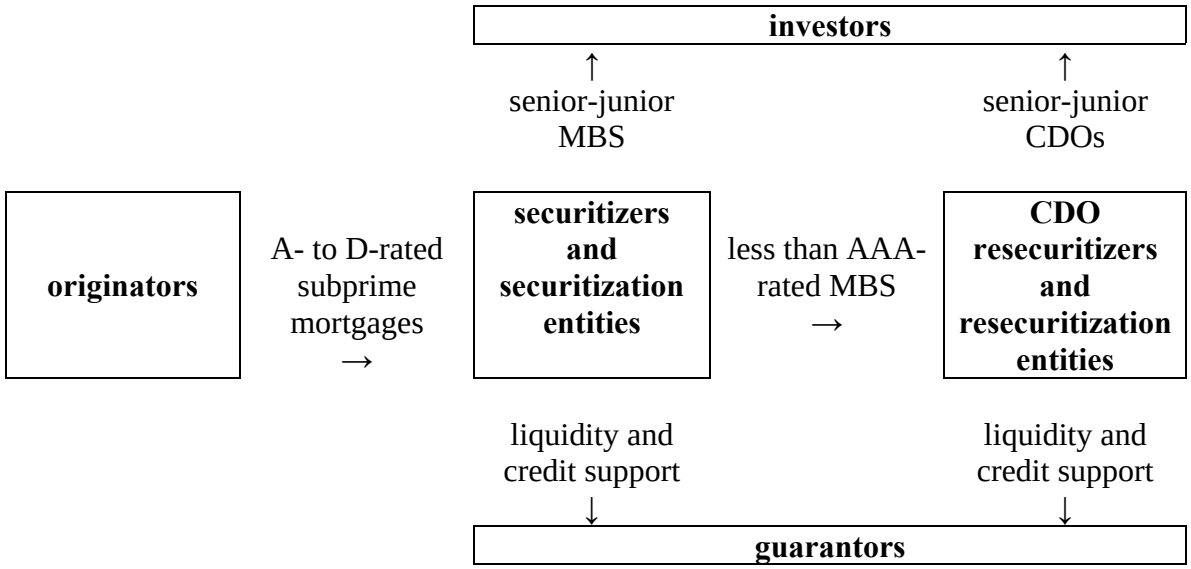


Panel B: January 2007-March 2008



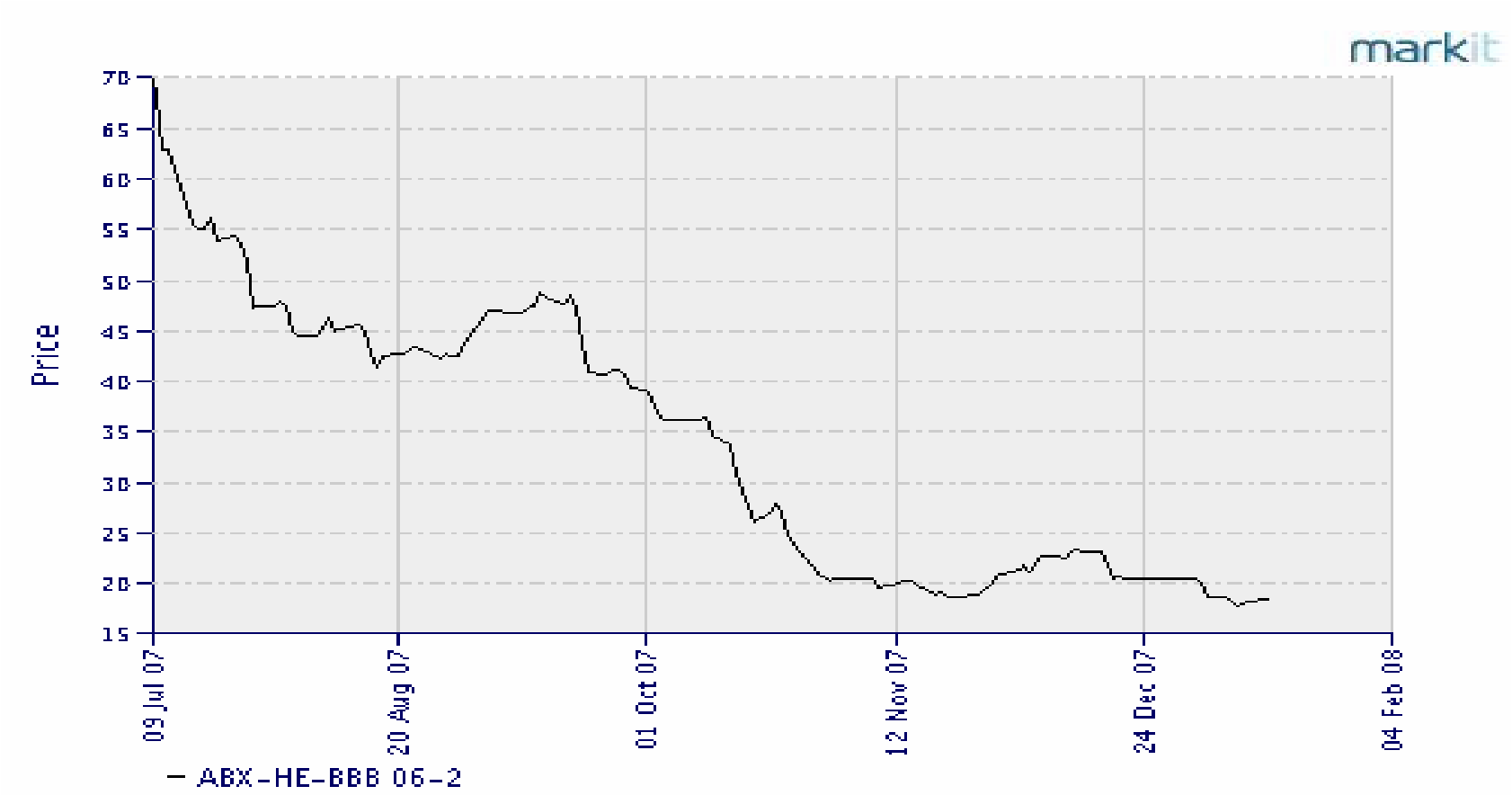
Source: http://www.yieldbook.com/m/home/index.shtml
Notes: BB is YieldBook's All BB, which includes BB+, BB, and BB-. Similarly, B is YieldBook's All B, which includes B+, B, and B-. The decline in the All BB spread in March 2008 is attributable to a reversal in the abnormally high spread for BB+ bonds (well above the spread for BB bonds) from February 2008; the spread on BB and BB- bonds increased in March 2008.

FIGURE 3
Subprime Mortgage Players, Positions, and Securitizations



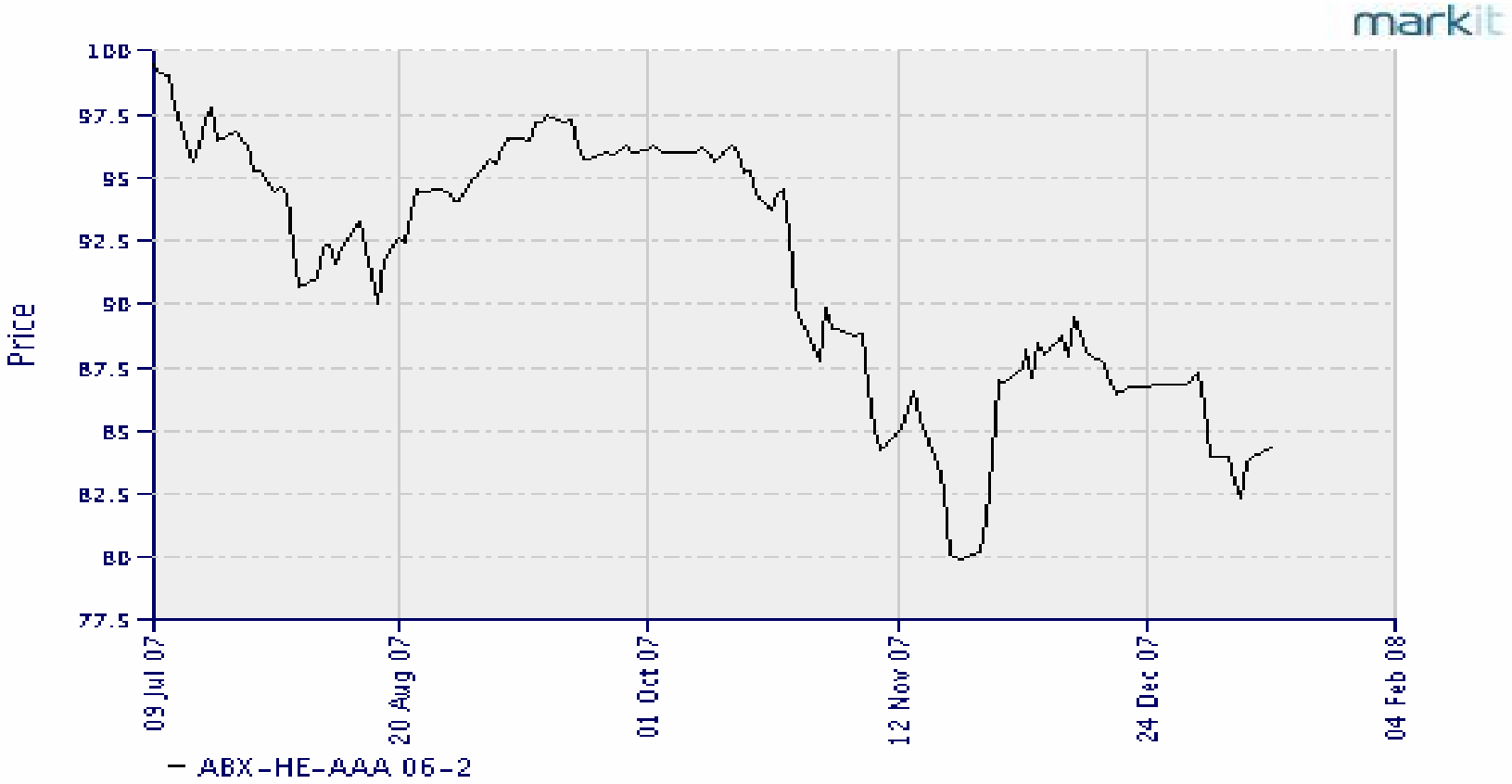
Notes: Originators may also be securitizers. Originators and securitizers may also be investors or guarantors.

Figure 4
Markit's ABX-HE-BBB 06-2 Index
July 9, 2007 to February 4, 2008



Note: Markit's methodology and updated graphs are available at www.markit.com.

FIGURE 5
Markit's ABX-HE-AAA 06-2 Index
July 9, 2007 to February 4, 2008



Note: Markit's methodology and updated graphs are available at www.markit.com.

FIGURE 6
Schema of Approaches to Recording Losses on Subprime Positions under the Governing Accounting Standards

Approach	Governing Accounting Standards and Positions
Fair valued	FAS 115 (trading securities and available-for-sale securities) FAS 133 (derivatives) FIN 45 (guarantees at inception) FAS 159 (positions for which fair value option is elected)
Not fair valued (but subject to impairment write-downs)	Write down to fair value: FAS 115 (held-to-maturity securities) Write down to another basis: FAS 5 and FAS 114 (held-for-investment loans)

Notes: Unrealized gains and losses on available-for-sale securities and cash flow hedge derivatives are recorded in other comprehensive income until they are realized or the position is impaired.