The current financial crisis and its implications

The root cause to weaknesses in loan
underwriting practices and lending systems

The main drivers that undermine borrowers,
lenders, and investors

Why a new generation of lending systems is needed

Market requirements and how a comprehensive
risk assessment framework can meet them

The notion of an underwriting gap and how it affects
the lenders’ underwriting practices

Typical issues associated with credit
scoring models

How improper use of credit scoring in under-
writing underestimates the borrower’s credit risk

The ways in which the current lending system
fails to address loan affordability

How mortgage and capital market financial
innovation relates to the crisis

Whether you are a borrower, a lender, or an
investor; Credit Risk Assessment enables you to better understand
the weaknesses in today’s loan
underwriting and to better cope with financial weaknesses
that threaten to overwhelm the current lending
system.

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Federal regulators for the mortgage
meltdown.

The current foreclosure and credit crisis. Rather than attempting to blame
lenders, borrowers, and/or federal regulators for the mortgage
meltdown, the Abrahams/Zhang lending model certainly offers some new food for thought.

In the wake of the credit crisis, it is clear that transparency is the key to not repeating
the past. This well-timed book explores how your company
can improve its current credit assessment system
and drive all transactions in a transparent
manner.

Credit Risk Assessment: The New Lending System for Borrowers, Lenders, and Investors

The New Lending System for Borrowers, Lenders, and Investors equips you with an effective comprehensive credit assess-
ment framework (CCA) that can provide early warning of risk, thanks to its forward-looking analyses that do not rely on the promise that the
past determines the future. Revealing how an existing credit underwriting system can be
extended to embrace all relevant factors and busi-
ness contexts in order to accurately classify credit
risk and drive all transactions in a transparent
manner, Credit Risk Assessment clearly lays out the
facts.

This well-timed book explores how your company
can improve its current credit assessment system
to balance risk and return and prevent future
financial disruptions. Describing how a new
and comprehensive lending framework can
achieve more complete and accurate credit risk
assessment while improving loan transparency,
affordability, and performance, Credit Risk Assess-
ment addresses:
Credit Risk Assessment
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Credit Risk Assessment
The New Lending System for Borrowers, Lenders, and Investors

Clark Abrahams
Mingyuan Zhang

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To Judy, Brad, Candice, and my lifelong mentor, Estella Hunter.
—Clark Abrahams

To Lily, our parents, and Amy, Larry, and Gary.
—Mingyuan Zhang
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In September 2008, the subprime mortgage crisis that began earlier in 2007 evolved into a global financial crisis, and further deepened the economic recession. This is the most serious economic downturn since the Great Depression and there are many opinions and theories concerning its causes and perpetrators. However, the root cause can be traced to incomplete credit risk assessment in lending systems that failed to qualify borrowers for appropriate and affordable loan products. Disconnects between lenders and investors, and lack of transparency in loan underwriting, rating, and securitization processes, only made matters worse. Simply recalibrating existing models and choosing the path of least resistance is a bad strategy that will fail to solve the problem at the root cause and expose us to more of the same. Hence, it is out of necessity that a paradigm shift in the lending system will emerge that benefits both lenders and borrowers, while promoting greater financial market stability and confidence among investors.

There are several factors that have hindered evolutionary improvements in these processes. First, very complicated proprietary processes are involved. There has been an overreliance upon, and lack of understanding of, technically complex credit granting and loan securitization practices and their associated assumptions. Part of the reason is the “secret sauce” nature of credit scoring models and how they are developed. Some solution vendors have steadfastly refused to share the details of their processes with federal regulators. Further complicating matters was the emergence of asset-backed securities, which evolved into very complex packaging of cash flows from the underlying securities. In the case of mortgages, those underlying securities added complexity due to imbedded options and...
elaborate pricing features. Furthermore, all parties have so much invested in the status quo, including credit scoring, that their thinking and perceived options seem to have been constrained by the presumption that any improvements in the system would build upon, rather than replace, what currently exists. There is a common mind-set in business, namely "If it isn’t broken, don’t fix it.” This sort of “Do Nothing” rationale, like the argument against preventative medicine, is just plain bad thinking. With any business solution, critical assumptions need to be identified and rechecked periodically. Fixing a system after it breaks is far more costly than if corrections are made in time to avoid failure.

This book describes how a new and comprehensive lending framework can achieve more complete and accurate credit risk assessment, while improving loan transparency, affordability, and performance. We introduce the concept of the underwriting gap, the starting point of the crisis, in order to expose weaknesses, and then offer a new way to evaluate and balance the risk to the lenders and investors, and the affordability for the borrowers. Instead of more narrowly addressing improvement of the lending system from the lender’s perspective, this book describes how a comprehensive credit assessment framework (CCAF, pronounced “See-Caf”) connects lenders, borrowers, and investors, with greater transparency. Existing credit risk assessment approaches put too much emphasis on past loan performance and historical market conditions but not enough on borrower capacity, new mortgage product risk characteristics, and economic cycles. CCAF would have provided early warning of the dangers because it provides forward-looking analyses and does not rely on the premise that the past determines the future. CCAF effectively signals deterioration in underlying instruments and considers a far broader range of possible future outcomes. Further, it identifies growing risk concentration exposures and emerging delinquency and default trends early on in the process to allow the course of events to be altered for the better.

The new lending system we propose represents a departure from the status quo, and may seem a bit unfamiliar and complex. There is a natural tendency for people to confuse lack of familiarity with complexity. In reality, the proposed new lending system will actually simplify today’s current underwriting processes, and make them more consistent, effective, and transparent. As with any solution, the “devil is in the details.” In this book we do more than describe a framework that provides sufficient
context to address the problem. We take it a step further to specify how
the framework works, with extensive examples throughout. The new
lending system offers an alternative to the current way of doing business
that will benefit borrowers, lenders, and investors. It will ensure that the
true credit risk is captured and the loan product chosen in order to maxi-
mize affordability over the life of the obligation. CCAF can help prevent
future financial disruption and can be easily modified for loss mitigation
for loans facing foreclosure and for reevaluation of securities backed by
those loans. We hope the new credit system described in the book will
meet with acceptance and help bring about the changes that are needed
to strengthen today’s credit system and restore confidence.

Organization of the Book

Chapter 1, Unpacking the Financial Crisis. This chapter provides an
overview of the current financial crisis and its implications. We first sur-
vey opinions and theories about causes and perpetrators. We trace the root
cause to weaknesses in loan underwriting practices and lending systems,
and identify the main drivers that undermine borrowers, lenders, and
investors. We discuss the fallout from various perspectives including all key
participants. Clearly, the current lending system needs a major overhaul.

Chapter 2, The Case for a Comprehensive Credit Assessment
Framework. In this chapter we explain why a new generation of lend-
ing systems is needed. We first provide a historical review of credit
market developments and point out areas where a comprehensive risk
assessment framework can help. We next provide a system overview and
describe the main components and interplay of this new system. Various
examples are provided to demonstrate how this framework can improve
the current lending system with respect to transparency and accuracy.

Chapter 3, The Lender and the Underwriting Gap. This chapter
describes the notion of the underwriting gap and how it affects lenders’
underwriting practices. We first define and identify the gap components
and explain how each of them contributed to the flaws in the current sys-
tem. In particular, we describe typical issues associated with credit scoring
models and how improper use of credit scoring in underwriting leads to
underestimation of the borrower’s credit risk. We describe how the new
system addresses and closes the underwriting gap.
Chapter 4, The Borrower and Loan Affordability. This chapter describes how the current lending system fails to address loan affordability. We provide detailed examples of different kinds of loan products and borrowers and how interests are better served by this new system. The added transparency afforded by CCAF will boost borrowers’ financial literacy and improve their credit standing and loan performance.

Chapter 5, The Investor and Financial Innovation. This chapter addresses how mortgage and capital market financial innovation relates to the crisis. In particular, we examine the connections among borrowers, lenders, and investors, and explain how transparency was lost during the entire process from loan origination through securitization and rating, and finally through sale to investors. CCAF is used to reestablish the connections by bringing greater transparency via effective monitoring of the performance of the underlying assets. As a result, investors are better informed about the risk of securities derived from loans.

Chapter 6, Crisis Intervention and Prevention. This chapter discusses how CCAF methodology enables development of an effective loan monitoring system for crisis intervention and prevention. We demonstrate how this monitoring system can benefit investors, borrowers, rating agencies, and lenders. We also discuss how CCAF can help government agencies anticipate lending problems through enhanced risk indicators and reporting systems. We end the book with our vision of a future credit system within a global context.

Audience for the Book
This book is a valuable reference for borrowers, investors, and lenders who seek a better understanding of the weaknesses in today’s loan underwriting and how they are impacted by them. Armed with this information, readers will be able to recognize and better cope with those weaknesses so as to achieve their financial goals. Some ways in which this book can benefit a particular audience include:

- Borrowers, who will better understand the loan underwriting process so they can spot predatory lending tactics and avoid unsuitable or overpriced loan products
- Lenders, who will more deeply understand the consequences of loan underwriting flaws that result in high risk concentrations and losses
• Investors, who will better understand risks associated with the mortgages that back their investment security and how those risks affect the performance and value of their investment
• Regulatory agencies, who will more proactively spot issues using new monitoring methods and technology

This book is also a valuable reference for use in developing countries where credit products are rapidly evolving and the need to avoid financial disruption is pronounced.

Clark Abrahams
Mingyuan Zhang
Chapter 1

Unpacking the Financial Crisis

*A problem well-defined is half solved.*

— JOHN DEWEY, EDUCATIONAL PIONEER

In September 2008, the subprime mortgage crisis emerged as a global economic crisis that rocked the world’s financial system and triggered responses from governments of many countries. On October 3, 2008, the Emergency Economic Stabilization Act of 2008 was signed into law to provide for a troubled asset relief program (TARP). Under this program a $700 billion liquidity pool was made available to purchase or insure any troubled assets and to cover any administrative and custodial expenses associated with purchasing, insuring, warehousing, and selling those assets. Government officials felt tremendous pressure to take swift action because they feared that the global financial system might collapse. However, the global financial markets have remained unstable with elevated systematic risk indicators, despite some significant financial market adjustments through a series of interventions carried out by the U.S. Department of the Treasury and the Federal Reserve System. According to the Global Financial Stability Report (GFSR), the International Monetary Fund (IMF) estimates that losses on U.S. subprime assets and securities will total $1.45 trillion—more than 59% above April 2008 estimates of $945 billion.¹ The crisis has caused the U.S. economy to continue to shrink. On October 30, 2008, the U.S. government confirmed that the gross domestic product (GDP) declined at an annual rate of 0.3% in the third
quarter, the largest contraction in seven years, while consumer disposable income declined 8.7%, the biggest drop on record.2

Based on these and other facts, it is entirely possible that the $700 billion initial allocation will prove insufficient to accomplish what is needed. The fact is that financial firms face simultaneous pressures posed by a reduction in assets, difficulties in raising capital, and challenges associated with implementing new business models. Hence, it is vital that we first seek to understand what is going on (that is, what caused the crisis, who played an active role in bringing it about, and what processes and controls failed to prevent it from reaching its enormous scope and scale). Failure to define a problem fully before solving it can result in flawed strategies that waste precious time and resources. In the business world, we call these “Ready, Fire, Aim” strategies. Only too often, they occur when there is never sufficient time devoted to fixing things right in the first place, but always enough time to repair them over and over again. It is in this spirit that we devote this first chapter to surveying various opinions concerning the causes of the current financial crisis; its impact, consequences, and implications; and finally the role of loan underwriting, which we see as being at the core of the problem.

It is abundantly clear that restoration of the public’s trust in financial institutions, and in securities that are derived from the loans they make, demands that we fix the flawed processes in loan underwriting and associated securitization process. Fixing the problem will require a new generation of lending systems, not a Band-Aid, if we truly hope to avoid similar future crises. In this book, we share our ideas for a new, comprehensive, and systematic approach to credit granting that combines the best of science, proven credit principles, and common sense. The success of this new approach will hinge partly on the lending industry’s willingness to invest time, effort, and resources to shore up gaps that have crept into our evolving consumer credit system over several decades.

This chapter provides an overview of the current financial crisis, the causes, the impact, consequences, and implications. There are many factors that are attributed as the causes of the crisis. Our focus here is on the major kinds of market participants, and how each of them is perceived to have contributed to, or been victimized by, the crisis. Our goal is to trace back from the events and consequences to identify the root causes, some of which remain obscured by layers of business processes
and by proprietary systems whose accuracy historically has been taken for granted and whose data, assumptions, formulas, and logic were thought to be valid.

The Financial Crisis

The financial crisis started with a downturn in the housing market of the United States in 2005–2006 after the growth in home prices in 2004 had surpassed any increase in the previous 25 years. Increased foreclosures on subprime mortgages raised concerns about the underwriting standards and the value of a number of mortgage-backed securities (MBS). These realizations became even more pronounced throughout 2007, and by 2008 the pervasiveness of the problems caused more widespread consequences and exposed severe weaknesses in the global financial system.

There have been many different financial crises in the past. All were caused by a variety of factors, and they each had different magnitudes and impacts on the economy. The current financial crisis is of a magnitude not seen since the Great Depression of the 1930s. There are significant differences between today’s situation and that of the Great Depression. Although it is still unclear how the current crisis will eventually play out, its breadth of scope and sheer magnitude are astonishing.

- **Scope.** The initial quality deterioration of U.S. subprime mortgages represented a credit event that rapidly transformed into a liquidity and solvency issue. This spilled over into a broader credit crunch and to many other financial products and market areas, further widening the economic crisis. Prime lending markets were affected because homeowners with more conventional loans saw their property values and equity decline. When homes in neighborhoods are left vacant in the aftermath of foreclosure, the impact is felt by all. Around 40 million such homes will suffer price declines averaging almost $9,000, which translates to a $350 billion drop in value. Current projections are that there will be nearly 2.2 million subprime foreclosures occurring in 2008 and 2009. Investors, both domestic and foreign, saw the ratings of AAA MBSs severely downgraded, and banks withdrew loan products from the market that featured low down-payment, interest only option pricing loans, and adjustable rate mortgage products with teaser rates. As
a result, speculators who bought homes hoping to flip them for a quick profit found it difficult to find borrowers who would qualify for higher monthly payments. And real estate developers who built spec homes and were in the process of developing entire subdivisions of single-family units also found housing demand slack off, and in many cases evaporate. Banks financing developers with acquisition and development loans found those loans slipping from pass credit grading to special mention or substandard status. This caused loan loss reserves to ramp up significantly. Liquidity shocks contributed to the rapid transmission of turbulence that began in the relatively small U.S. subprime mortgage market and spread to other financial markets in the United States and abroad. According to the IMF, the ongoing deleveraging process has accelerated and threatens to become disorderly, increasing the risk of a severe adverse feedback loop between the financial system and the broader economy.

- **Magnitude.** Losses have been astronomical. On a global scale there were write-downs of $585 billion by financial institutions, one of the most costly ones ever. There were meltdowns of large financial institutions including Lehman Brothers and Washington Mutual. Since January 1, 2008, owners of stocks in U.S. corporations have suffered about $8 trillion in losses, as their holdings declined in value from $20 trillion to $12 trillion. Losses in other countries have averaged about 40%. Extensive fluctuations in financial markets have caused some investors to panic. Volatility has ruled the markets, reflecting a general lack of investor confidence. Fear eclipsed greed as the primary driver in the equity markets, and it reached historically high levels. Holders of mortgages in the United States, approximately 70% of homeowners, have exhibited historically high delinquency rates. A crisis of this magnitude is particularly troubling partly because it was not spotted in time to take preventative measures, and partly because top officials in the government and financial industry still appeared not to know how large the problem was at the time that the emergency legislation was passed.

In the next section, we explore thinking from a variety of sources who attempt to explain how and why the crisis came about.
Causes of the Crisis

There are many opinions and theories concerning the causes of the financial crisis. In this section, we have attempted to capture as complete a range of opinions as possible. These are not our opinions, and we have taken the liberty to paraphrase what we have heard in order to provide the essence of what has been alleged. The list of suspects is long, and for ease of discussion we classified the causes into four categories: (1) market, economy, and regulations, (2) stakeholders and participants, (3) practices and products, and (4) human behavior and traits, as shown in Exhibit 1.1.

Market, Economy, and Regulations

- **Housing Market Downturn.** Loss of borrower equity and real estate liquidity. The financial crisis’s “proximate cause was the end of the U.S. housing boom.” This was reflected by a large decline in housing prices, which reduced the incentive of homeowners to repay their mortgages. It was estimated in October 2008 that 23% of mortgage holders owe more than their houses are worth. This was expected to increase to 28% over the next 12 months. The median home prices in the country dropped 9% from September 2007 to September 2008. The wave of foreclosures has had a dramatic effect on house prices, reversing the housing boom of the last few years and causing the first national decline in house prices since the 1930s. At present, there is a glut of four million unsold homes that is depressing prices, as builders have also been forced to lower prices to get rid of unsold properties.

- **Regulatory and Internal Controls.** Concerns of oversight adequacy and safeguard sufficiency. Massive failure in such a highly regulated industry raises questions. For example,
  - Where was risk limitation addressed, and what were the key risk indicators?
  - What were the thresholds, who set them, and how were they determined?
  - How often was risk monitoring performed, at what level, and by whom?
  - What capital is adequate to back loans and asset-backed securities, and what additional capital is required for off-balance assets?
• What stress testing methodology was utilized? Specifically, did stress tests, or performance simulations, include sufficient numbers of scenarios? To what degree did those scenarios capture measures that characterized business, borrower, and market realities, including extreme values of those measures that reflect the full range or risk that could be encountered? Credit risk models, in practice, have tended to underestimate the probability of
extreme outcomes, while overestimating the risk associated with more common outcomes.

• **Tax Treatment.** Income and property tax incentives at federal and state levels. These include tax deductibility for home mortgage interest, no capital gains for home sales of less than $600,000, property tax relief via state homestead laws, and so on.\(^{16}\)

• **Basel Accord.** Shifting risky activities off balance sheets. The 1988 Basel Accord encouraged banks to shift risky activities off balance sheets. The growth of structured investment vehicles (SIVs) and conduits were byproducts of regulatory guidelines dealing with capital adequacy. The creation of these off–balance sheet entities allowed banks to reduce the capital associated with a given risk profile. In addition, it reduced the transparency of risky activities and hid them from regulatory scrutiny.\(^ {17}\) The Basel Accord was also criticized for its lack of specific requirements for liquidity, and the accord’s approach encouraged regulators to emphasize the importance of liquidity in their supervisory activities, and encourage loan securitization.\(^ {18}\)

• **Community Reinvestment Act (CRA).**\(^ {19}\) Encouragement of lending to unqualified borrowers. While CRA was intended to help improve the welfare of society, banks were criticized for not making enough loans to low- and moderate-income borrowers. Some have blamed banks for making too many subprime loans to those borrowers in response to CRA.\(^ {20}\)

**Stakeholders and Participants**

• **Borrower.** Financially unsophisticated and irresponsible borrowing. Borrowers knew what they were signing up for and threw caution to the wind. Sometimes they gave misleading information about their income or assets in order to get a loan that they could not afford. Borrowers knew that the rates were going to rise, but bet on the appreciation of their homes. They could get a subprime mortgage at a low rate for two or three years and then refinance before the rates reset at a lower fixed rate. Some used financial leverage to borrow more money for home, stocks, or other assets. It turns out the housing market went the other way, and with lower home values, refinancing was not an option.
• **Credit Bureaus.** Incomplete credit scoring models underestimated the borrower’s risk. Traditional credit scoring has been less effective in credit assessment for new and innovative loan products. For example, “the once-vaulted Fair, Isaac and Company (FICO) credit scoring system” is now being blamed for failing to signal risky borrowers in the mortgage market.21

• **Speculators.** Evidenced by nonowner-occupied property purchases in real estate market for investment purpose. Speculation in real estate was suggested as a contributing factor to the subprime crisis. During 2006, 22% of homes purchased (1.65 million units) were for investment purposes, with an additional 14% (1.07 million units) purchased as vacation homes; nearly 40% of home purchases (record levels) were not primary residences. Speculators left the market in 2006, which caused investment sales to fall much faster than the primary market.22

• **Banks.** “[L]everaged losses” theory—banks have so much leverage, they contract their lending by a multiple of their credit losses in order to restore their balance sheets. The resulting contraction in bank lending then leads to a substantial decline in aggregate spending, because bank loans cannot be replaced by credit from other sources.23 Many MBSs, which were funded with short-term borrowing, were kept on bank balance sheets.24

• **Appraisers.** Inflated valuations fueled a market bubble. Conservative appraisals of home values were abandoned in favor of higher valuation. According to a 2003 study by October Research Corporation, 55% of appraisers reported being pressured by mortgage lenders, brokers, consumers, and real estate agents to inflate home values. A follow-up study released earlier this year shows that 90% of appraisers are reporting pressure to inflate home values. Appraisers depended on mortgage brokers and lenders for new business, and some submitted fake documents, failed to actually inspect the property being appraised, or based the appraisal on outdated comps. Lenders and brokers have been willing to overlook these inflated values, the theory goes, because the loans have been bundled up and resold to unsuspecting investors.25

• **Builders.** Created oversupplies of new homes. The building industry makes up 15% of the U.S. economy, and in 2006 home
construction reached its highest level in 30 years. Many assert that housing is overbuilt on the high end and overpriced. According to William Wheaton, an economist with MIT’s Center for Real Estate, there was a great deal of overbuilding, driven in part by home speculators, and this resulted in more than 1 million extra homes sitting in the market, even after home building had been cut by 50% and massive layoffs.  

- **Developer (house zoning).** Artificially increased housing prices. Zoning restrictions account for a high percentage of the total cost of housing in some of the nation’s most expensive real estate markets. Restrictive zoning greatly increases housing prices by reducing the amount of land on which new housing can be built and also by reducing the amount of housing that can be built even in those areas where residential construction is permitted. Higher housing prices helped cause the subprime mortgage crisis by forcing home buyers to borrow more money in order to purchase homes of a given size and location. It was suggested that if prices had been lower, so too would homeowner indebtedness. Fewer buyers would be on the verge of default as a result of a market downturn; their debt burden would likely have been much smaller relative to their income.

- **Lenders, Brokers, and Real Estate Agents.** They displayed commission-driven behavior: (1) practiced predatory lending and took advantage of borrower’s financial illiteracy and (2) aggressively made the subprime loans for higher commissions, and offered low teaser interest rate under intensive competition from other lenders. Lenders were able to maximize their revenue by disproportionately marketing and underwriting subprime loans based on introductory interest rates that were, in the long run, much more expensive. They had strong incentives to originate mortgages in large volume and relatively little incentive to scrutinize whether the loans would perform satisfactorily over time. Lenders had little incentive to worry about loan performance, knowing that the loans would be pooled for sale in the secondary market and subsequently held by investors.

- **Government Sponsored Enterprises (GSEs).** Creation of excessive MBS. Huge quantities of loans were bought and packaged into
mortgage-backed securities. These bonds removed hazard from the banks and shifted it to investors and the federal government.

- **Independent Mortgage Companies.** Less-regulated lenders were responsible for selling high-cost mortgages. About half the high-cost subprime mortgages came from independent mortgage companies, which are not subject to CRA or the same degree of oversight that banks operate under.  

- **Public Advocates.** They overpromoted financial innovation. The National Homeownership Strategy promoted the availability of affordable housing through the use of creative financing techniques.

- **Securities and Exchange Commission and Federal Bank Regulators.** Regulations were insufficient. They encouraged the rapid growth of over-the-counter (OTC) derivatives and securities of all types of financial institutions. There was failure to put in place sufficient regulations.

- **Rating Agencies.** Inaccurate ratings. Recently, rating agencies have taken a lot of heat regarding their responsibility in the subprime crisis. They underestimated the risk of structured financial products because rating agencies are paid by bond sellers, not buyers, and their revenue mainly comes from the investment banks that created the collateralized debt obligations (CDOs) and related structured products. The role of the rating agencies in the subprime crisis will be covered in detail in Chapters 5 and 6.

- **Investment Banks/Securitizers.** Creation of exotic financial products with opacity. These participants have been alleged to have been motivated more by issuance and arrangement fees and less by concern for the longer-run performance of these securities. They created exotic and innovative structured financial products backed by subprime loans, which stimulated subprime lending and also investor demand for securities derived from risky loans. Investment banks securitized assets and created the structured financial products that were not transparent and were well beyond the understanding of the average investor.

- **Investors.** Overreliance on rating agencies and failure to perform due diligence. In the past, rating agencies have done a reasonably good job of helping investors determine the riskiness of a particular investment security. Investors needed transparent ratings for all
securities they are considering for investment, and their confidence has been shaken by massive downgrades of MBSs, some of which were rated as highest quality (AAA).

- **Hedge Funds.** They took large long and short positions in subprime MBSs. Their assets, liabilities, and trading activities are not transparent entities and not disclosed publicly. They are often highly leveraged, using derivatives or borrowing large amounts to invest. So other investors and regulators knew little of hedge funds’ activities. Because of their leverage, their “impact in the global credit markets is greater than their assets under management would indicate.”

Practices and Products

- **Mortgage Fraud.** Inflated prices. This was identified as one of the main drivers for subprime mortgage defaults. Typical fraud included misrepresentation of occupancy, suspicious items on the borrower’s credit report, miscalculation of debt-to-income (DTI) ratio, and falsely stated income. It was also suggested that some borrowers and intermediaries in the housing market inflated appraisals and overstated transaction prices, which increased foreclosure rates.

- **Lending Business Model.** This provided little incentive to maintain loan quality. “A significant and distinctive contributing factor to the outbreak of the current turmoil was the proliferation of the originate-to-distribute model (OTD model) based on the financial technology of securitization.” Traditionally, banks have financed their mortgage lending through the deposits they receive from their customers. This has limited the amount of mortgage lending they could do. Over the past 20 years, banks have moved to a new model where they originate loans or purchase them from brokers and then transfer them to a third party who packages the loans into a CDO for sale to investors. This so-called originate-to-distribute model has made it much easier to fund additional borrowing but has also caused moral hazard, as Chairman Bernanke pointed out. This is because the model created some severe incentive problems. Commonly referred to as principal-agent problems, or more simply as...
agency problems, these situations arise when an agent (the originator of the loans) does not have an incentive to act fully in the interest of the principal (the ultimate holder of the loan). Originators had every incentive to maintain origination volume, because that allowed them to earn substantial fees. However, originators had weak incentives to maintain loan quality. 39

- **Unfair Lending Practices.** Predatory lending or steering. These include the practices that target minority or unsophisticated borrowers who are qualified for prime loans and then steer them into higher-priced subprime mortgages. 40 In some instances originators and borrowers collaborated to overstate income, misrepresent occupancy, and hide other details in order to get a loan. 41

- **Subprime Mortgage Lending.** Excessive subprime lending. Subprime mortgages are based on lenders taking big risks on loans to people who could be considered less than qualified. Mortgage companies require little money down on many of these loans and offer “introductory” rates that were below the prime rate—yet subprime. Subprime mortgage originations grew from $173 billion in 2001 to a record level of $665 billion in 2005. 42 This caused a tremendous oversupply of homes, which, in turn resulted in the housing market bubble. Recent research has asserted that subprime lending drove house price increases in some areas. Mortgage credit underwriting standards were relaxed from 2001 to 2005 in zip codes with large numbers of high-risk borrowers and negative relative income and employment growth. Relaxed standards were associated with increased mortgage lending, rising house prices, and a subsequent increase in defaults, which caused the housing bubble to burst. 43

- **Flawed Underwriting Practices and Standards.** Failure to gauge borrower ability to repay. Many subprime loans were awarded to borrowers without traditional screening processes, including checking the borrowers’ income figures to make sure they could pay back the loans. 44 Models used to assess borrower risk in mortgage lending almost exclusively restricted their input to historical data. The driving analogy is that a rearview mirror is helpful, but not for seeing what is coming at you, such as the driver who crossed the center median and hit you head on, an event that is not supposed
to happen. Underwriting standards were too busy looking back at past loan performance to pay attention to their exposure to changes in future market states and borrower conditions. Furthermore, loans having teaser rates became accidents waiting to happen when their rates, and monthly payments, escalated due to rising interest rates.

- **Automated Underwriting.** Efficient but not effective. It has been recognized that development in automated underwriting technology has played a significant role in encouraging lenders to penetrate deeper into the subprime loan pool. Subprime lenders like automated underwriting because it is cheap and fast. A 2001 Fannie Mae survey found that automated underwriting reduced the average cost to lenders of closing a loan by $916. The software aims to quickly weed out the very riskiest of applicants and automatically approve the rest.\(^{45}\) Obviously, automation breeds efficiency, but it must be designed in such a fashion as to also be effective. Otherwise, you have only succeeded in creating a faster way to lose money and put borrowers at risk!

- **Risk Management.** Separation of science and business. “All the drama and chaos of recent months obscures the most fundamental cause of the entire financial crisis: a basic misunderstanding of risk (abetted by heavy borrowing).”\(^{46}\) We can put this observation in the broader category of ineffective risk management.\(^{47}\) Because risk management techniques have become so complex and require a high proficiency of sophistication and quantitative expertise, we tend to see highly educated technicians creating the models that business people use. Unfortunately, as Stanford University Professor Sam Savage has noted, an “algebraic curtain” separates business people from the underlying science. Conversely, the scientists rarely possess sufficient knowledge of the business and market realities to ensure that their models are truly reflections of the real world. This observation extends from the use of credit scoring methodologies to the types of models used to develop mortgage-backed securities (MBSs), such as collateralized debt obligations.

- **Exotic Loan Products.** Some bank regulators have called these financial time bombs. These exotic products include (1) no down payment requirement; (2) no documented or verified income requirement; (3) an adjustable interest rate, coupled with a low
introductory teaser rate; (4) prolonged deferred principal repayment in the case of interest only option mortgages, which have a very low monthly payment for the first several years. An analogy to auto manufacturing has become common in subprime lending, where it appears one out of five subprime loans will end in foreclosure. The analogy poses the question “If one out of five cars of a specific make and model coming off the assembly line ended up in a serious accident, would people consider it a problem with the car or operator error?” 48 “Risky mortgage products, not risky borrowers, are at the root of the growing foreclosure epidemic.” 49

• **Financial Innovations.** These have spread confusion and trapped investors. Financial innovation fueled economic growth. However, over the last several years, many innovative financial products were sold on false pretenses. This led to “the creation of complex and opaque financial instruments that proved fragile under stress.” 50 They were promoted as ways to spread risk and make investment safer. In fact, their creators made a huge profit and did not have to repay when it all went bust. Instead of diversifying risk, investors were lured to take on more risk than they realized. 51

We also see human behavioral traits as playing a major role and it is doubtful that anyone can effectively change them.

**Human Behavioral Traits**

• **Greed.** Chasing excessive profits. Greed is a natural tendency, and it is ever-present; it overwhelms better judgment when not kept in check. We see this as one of the core drivers of the financial crisis, and it cropped up among borrowers, lenders, investors, and many other participants who had something to gain by perpetuating what became a spiraling catastrophe.

• **Near-Term Focus.** Neglect of future consequences. It is the tendency to act to reap immediate benefits and let tomorrow take care of itself. The consequences of loose underwriting standards are years away for a hybrid adjustable rate mortgage (ARM) product, and it is not surprising that a quota-driven sales force would not trouble themselves with concern about what might happen in the future when they have to meet more immediate expectations.