If the efficient market hypothesis were taken to the extreme, there would be no point in active security analysis; only fools would commit resources to actively analyze securities. Without ongoing security analysis, however, prices eventually would depart from "correct" values, creating new incentives for experts to move in. Therefore, even in environments as competitive as the financial markets, we may observe only *near*-efficiency, and profit opportunities may exist for especially diligent and creative investors. In Chapter 12, we examine such challenges to the efficient market hypothesis, and this motivates our discussion of active portfolio management in Part Seven. More important, our discussions of security analysis and portfolio construction generally must account for the likelihood of nearly efficient markets.

1.6 The Players

From a bird's-eye view, there would appear to be three major players in the financial markets:

1. Firms are net demanders of capital. They raise capital now to pay for investments in plant and equipment. The income generated by those real assets provides the returns to investors who purchase the securities issued by the firm.
2. Households typically are net suppliers of capital. They purchase the securities issued by firms that need to raise funds.
3. Governments can be borrowers or lenders, depending on the relationship between tax revenue and government expenditures. Since World War II, the U.S. government typically has run budget deficits, meaning that its tax receipts have been less than its expenditures. The government, therefore, has had to borrow funds to cover its budget deficit. Issuance of Treasury bills, notes, and bonds is the major way that the government borrows funds from the public. In contrast, in the latter part of the 1990s, the government enjoyed a budget surplus and was able to retire some outstanding debt.

Corporations and governments do not sell all or even most of their securities directly to individuals. For example, about half of all stock is held by large financial institutions such as pension funds, mutual funds, insurance companies, and banks. These financial institutions stand between the security issuer (the firm) and the ultimate owner of the security (the individual investor). For this reason, they are called *financial intermediaries.* Similarly, corporations do not market their own securities to the public. Instead, they hire agents, called investment bankers, to represent them to the investing public. Let's examine the roles of these intermediaries.

Financial Intermediaries

Households want desirable investments for their savings, yet the small (financial) size of most households makes direct investment difficult. A small investor seeking to lend money to businesses that need to finance investments doesn't advertise in the local newspaper to find a willing and desirable borrower. Moreover, an individual lender would not be able to diversify across borrowers to reduce risk. Finally, an individual lender is not equipped to assess and monitor the credit risk of borrowers.

For these reasons, **financial intermediaries** have evolved to bring the suppliers of capital (investors) together with the demanders of capital (primarily corporations and the federal government). These financial intermediaries include banks, investment companies,

insurance companies, and credit unions. Financial intermediaries issue their own securities to raise funds to purchase the securities of other corporations.

For example, a bank raises funds by borrowing (taking deposits) and lending that money to other borrowers. The spread between the interest rates paid to depositors and the rates charged to borrowers is the source of the bank's profit. In this way, lenders and borrowers do not need to contact each other directly. Instead, each goes to the bank, which acts as an intermediary between the two. The problem of matching lenders with borrowers is solved when each comes independently to the common intermediary.

Financial intermediaries are distinguished from other businesses in that both their assets and their liabilities are overwhelmingly financial. Table 1.3 presents the aggregated balance sheet of commercial banks, one of the largest sectors of financial intermediaries. Notice that the balance sheet includes only very small amounts of real assets. Compare Table 1.3 to the aggregated balance sheet of the nonfinancial corporate sector in Table 1.4, for which real assets are about half of all assets. The contrast arises because intermediaries simply move funds from one sector to another. In fact, the primary social function of such intermediaries is to channel household savings to the business sector.

Other examples of financial intermediaries are investment companies, insurance companies, and credit unions. All these firms offer similar advantages in their intermediary role. First, by pooling the resources of many small investors, they are able to lend considerable sums to large borrowers. Second, by lending to many borrowers, intermediaries achieve significant diversification, so they can accept loans that individually might be too risky. Third, intermediaries build expertise through the volume of business they do and can use economies of scale and scope to assess and monitor risk.

Investment companies, which pool and manage the money of many investors, also arise out of economies of scale. Here, the problem is that most household portfolios are not

Assets	$ Billion	% Total	Liabilities and Net Worth	$ Billion	% Total
Real assets			**Liabilities**		
Equipment and premises	$ 111.9	0.8%	Deposits	$11,349.4	76.2%
Other real estate	13.2	0.1	Debt and other borrowed funds	1,038.1	7.0
Total real assets	$ 125.2	0.8%	Federal funds and repurchase agreements	259.4	1.7
			Other	563.7	3.8
			Total liabilities	$13,210.6	88.7%
Financial assets					
Cash	$ 1,686.4	11.3%			
Investment securities	3,425.4	23.0			
Loans and leases	8,060.9	54.1			
Other financial assets	553.0	3.7			
Total financial assets	$13,725.7	92.2%			
Other assets					
Intangible assets	$ 350.4	2.4%			
Other	692.1	4.6			
Total other assets	$ 1,042.5	7.0%	*Net worth*	$ 1,682.8	11.3%
Total	$14,893.4	100.0%		$14,893.4	100.0%

Table 1.3

Balance sheet of FDIC-insured commercial banks and savings institutions
Note: Column sums may differ from total because of rounding error.
Source: Federal Deposit Insurance Corporation, **www.fdic.gov**, March 2016.

Assets	$ Billion	% Total	Liabilities and Net Worth	$ Billion	% Total
Real assets			**Liabilities**		
Equipment and intellectual property	$ 6,713	17.0%	Bonds and mortgages	$ 6,046	15.3%
Real estate	12,485	31.6	Bank loans	948	2.4
Inventories	2,219	5.6	Other loans	1,103	2.8
Total real assets	$21,417	54.2%	Trade debt	1,969	5.0
			Other	6,636	16.8
			Total liabilities	$16,702	42.3%
Financial assets					
Deposits and cash	$ 992	2.5%			
Marketable securities	955	2.4			
Trade and consumer credit	2,719	6.9			
Other	13,418	34.0			
Total financial assets	$18,084	45.8%	*Net worth*	$22,799	57.7%
Total	$39,501	100.0%		$39,501	100.0%

Table 1.4

Balance sheet of U.S. nonfinancial corporations
Note: Column sums may differ from total because of rounding error.
Source: *Flow of Funds Accounts of the United States,* Board of Governors of the Federal Reserve System, March 2016.

large enough to be spread across a wide variety of securities. In terms of brokerage fees and research costs, purchasing one or two shares of many different firms is very expensive. Mutual funds have the advantage of large-scale trading and portfolio management, while participating investors are assigned a prorated share of the total funds according to the size of their investment. This system gives small investors advantages they are willing to pay for via a management fee to the mutual fund operator.

Investment companies also can design portfolios specifically for large investors with particular goals. In contrast, mutual funds are sold in the retail market, and their investment philosophies are differentiated mainly by strategies that are likely to attract a large number of clients.

Like mutual funds, *hedge funds* also pool and invest the money of many clients. But they are open only to institutional investors such as pension funds, endowment funds, or wealthy individuals. They are more likely to pursue complex and higher-risk strategies. They typically keep a portion of trading profits as part of their fees, whereas mutual funds charge a fixed percentage of assets under management.

Economies of scale also explain the proliferation of analytic services available to investors. Newsletters, databases, and brokerage house research services all engage in research to be sold to a large client base. This setup arises naturally. Investors clearly want information, but with small portfolios to manage, they do not find it economical to personally gather all of it. Hence, a profit opportunity emerges: A firm can perform this service for many clients and charge for it.

Investment Bankers

Just as economies of scale and specialization create profit opportunities for financial intermediaries, so do these economies create niches for firms that perform specialized services for businesses. Firms raise much of their capital by selling securities such as stocks and

WORDS FROM THE STREET

Separating Commercial Banking from Investment Banking

Until 1999, the Glass-Steagall Act had prohibited banks in the United States from both accepting deposits and underwriting securities. In other words, it forced a separation of the investment and commercial banking industries. But when Glass-Steagall was repealed, many large commercial banks began to transform themselves into "universal banks" that could offer a full range of commercial and investment banking services. In some cases, commercial banks started their own investment banking divisions from scratch, but more frequently they expanded through merger. For example, Chase Manhattan acquired J.P. Morgan to form JPMorgan Chase. Similarly, Citigroup acquired Salomon Smith Barney to offer wealth management, brokerage, investment banking, and asset management services to its clients. Most of Europe had never forced the separation of commercial and investment banking, so their giant banks such as Credit Suisse, Deutsche Bank, HSBC, and UBS had long been universal banks. Until 2008, however, the stand-alone investment banking sector in the U.S. remained large and apparently vibrant, including such storied names as Goldman Sachs, Morgan-Stanley, Merrill Lynch, and Lehman Brothers.

But the industry was shaken to its core in 2008, when several investment banks were beset by enormous losses on their holdings of mortgage-backed securities. In March, on the verge of insolvency, Bear Stearns was merged into JPMorgan Chase. On September 14, 2008, Merrill Lynch, also suffering steep mortgage-related losses, negotiated an agreement to be acquired by Bank of America. The next day, Lehman Brothers entered into the largest bankruptcy in U.S. history, having failed to find an acquirer able and willing to rescue it from its steep losses. The next week, the only two remaining major independent investment banks, Goldman Sachs and Morgan Stanley, decided to convert from investment banks to traditional bank holding companies. In doing so, they became subject to the supervision of national bank regulators such as the Federal Reserve and the far tighter rules for capital adequacy that govern commercial banks. The firms decided that the greater stability they would enjoy as commercial banks, particularly the ability to fund their operations through bank deposits and access to emergency borrowing from the Fed, justified the conversion. These mergers and conversions marked the effective end of the independent investment banking industry—but not of investment banking. Those services are now supplied by the large universal banks.

Today, the debate about the separation between commercial and investment banking that seemed to have ended with the repeal of Glass-Steagall has come back to life. The Dodd-Frank Wall Street Reform and Consumer Protection Act places new restrictions on bank activities. For example, the Volcker Rule, named after former chairman of the Federal Reserve Paul Volcker, prohibits banks from "proprietary trading," that is, trading securities for their own accounts, and restricts their investments in hedge funds or private equity funds. The rule is meant to limit the risk that banks can take on. While the Volcker Rule is far less restrictive than Glass-Steagall had been, they both are motivated by the belief that banks enjoying Federal guarantees should be subject to limits on the sorts of activities in which they can engage. Proprietary trading is a core activity for investment banks, so limitations on this activity for commercial banks reintroduces a separation between their business models.

bonds to the public. Because these firms do not do so frequently, however, **investment bankers** that specialize in such activities can offer their services at a cost below that of maintaining an in-house security issuance division. In this role, they are called *underwriters.*

Investment bankers advise the issuing corporation on the prices it can charge for the securities issued, appropriate interest rates, and so forth. Ultimately, the investment banking firm handles the marketing of the security in the **primary market,** where new issues of securities are offered to the public. Later, investors can trade previously issued securities among themselves in the so-called **secondary market.**

For most of the last century, investment banks and commercial banks in the U.S. were separated by law. While those regulations were effectively eliminated in 1999, the industry known as "Wall Street" was until 2008 still comprised of large, independent investment banks such as Goldman Sachs, Merrill Lynch, and Lehman Brothers. But that stand-alone model came to an abrupt end in September 2008, when all the remaining major U.S. investment banks were absorbed into commercial banks, declared bankruptcy, or reorganized as commercial banks. The nearby box presents a brief introduction to these events.

Venture Capital and Private Equity

While large firms can raise funds directly from the stock and bond markets with help from their investment bankers, smaller and younger firms that have not yet issued securities to the public do not have that option. Start-up companies rely instead on bank loans and

investors who are willing to invest in them in return for an ownership stake in the firm. The equity investment in these young companies is called **venture capital (VC).** Sources of venture capital are dedicated venture capital funds, wealthy individuals known as *angel investors,* and institutions such as pension funds.

Most venture capital funds are set up as limited partnerships. A management company starts with its own money and raises additional capital from limited partners such as pension funds. That capital may then be invested in a variety of start-up companies. The management company usually sits on the start-up company's board of directors, helps recruit senior managers, and provides business advice. It charges a fee to the VC fund for overseeing the investments. After some period of time, for example, 10 years, the fund is liquidated and proceeds are distributed to the investors.

Venture capital investors commonly take an active role in the management of a start-up firm. Other active investors may engage in similar hands-on management but focus instead on firms that are in distress or firms that may be bought up, "improved," and sold for a profit. Collectively, these investments in firms that do not trade on public stock exchanges are known as **private equity** investments.

1.7 The Financial Crisis of 2008

This chapter has laid out the broad outlines of the financial system, as well as some of the links between the financial side of the economy and the "real" side in which goods and services are produced. The financial crisis of 2008 illustrated in a painful way the intimate ties between these two sectors. We present in this section a capsule summary of the crisis, attempting to draw some lessons about the role of the financial system as well as the causes and consequences of what has become known as *systemic risk.* Some of these issues are complicated; we consider them briefly here but will return to them in greater detail later in the text once we have more context for analysis.

Antecedents of the Crisis

In early 2007, most observers thought it inconceivable that within two years, the world financial system would be facing its worst crisis since the Great Depression. At the time, the economy seemed to be marching from strength to strength. The last significant macroeconomic threat had been from the implosion of the high-tech bubble in 2000–2002. But the Federal Reserve responded to an emerging recession by aggressively reducing interest rates. Figure 1.1 shows that Treasury bill rates dropped drastically between 2001 and 2004, and the LIBOR rate, which is the interest rate at which major money-center banks lend to each other, fell in tandem.[5] These actions appeared to have been successful, and the recession was short-lived and mild.

By mid-decade the economy was apparently healthy once again. Although the stock market had declined substantially between 2001 and 2002, Figure 1.2 shows that it reversed direction just as dramatically beginning in 2003, fully recovering all of its post-tech-meltdown losses within a few years. Of equal importance, the banking sector seemed healthy. The spread between the LIBOR rate (at which banks borrow from each other) and the Treasury-bill rate (at which the U.S. government borrows), a common measure of credit risk in the banking sector (often referred to as the *TED spread*[6]), was

[5]LIBOR stands for London Interbank Offer Rate. It is a rate charged in an interbank lending market outside of the U.S. (largely centered in London). The rate is typically quoted for 3-month loans.

[6]TED stands for Treasury–Eurodollar spread. The Eurodollar rate in this spread is in fact LIBOR.

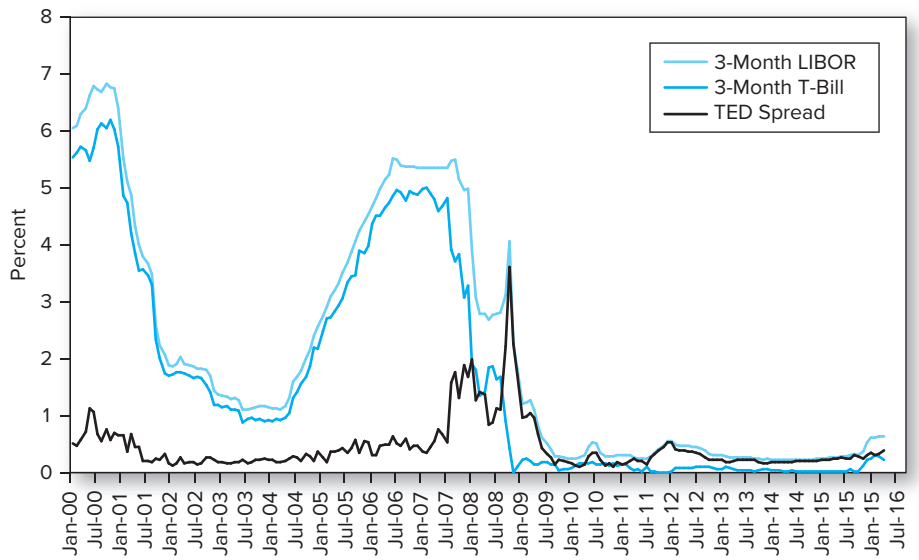

Figure 1.1 Short-term LIBOR and Treasury-bill rates and the TED spread

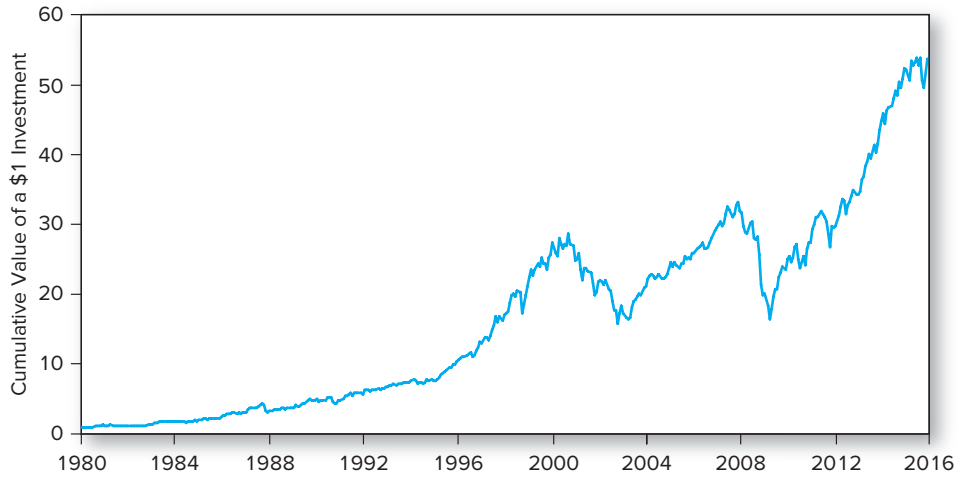

Figure 1.2 Cumulative returns on the S&P 500 index

only around .25% in early 2007 (see the bottom curve in Figure 1.1), suggesting that fears of default or "counterparty" risk in the banking sector were extremely low.

Indeed, the apparent success of monetary policy in this recession, as well as in the last 30 years more generally, had engendered a new term, the "Great Moderation," to describe the fact that recent business cycles—and recessions in particular—seemed so mild

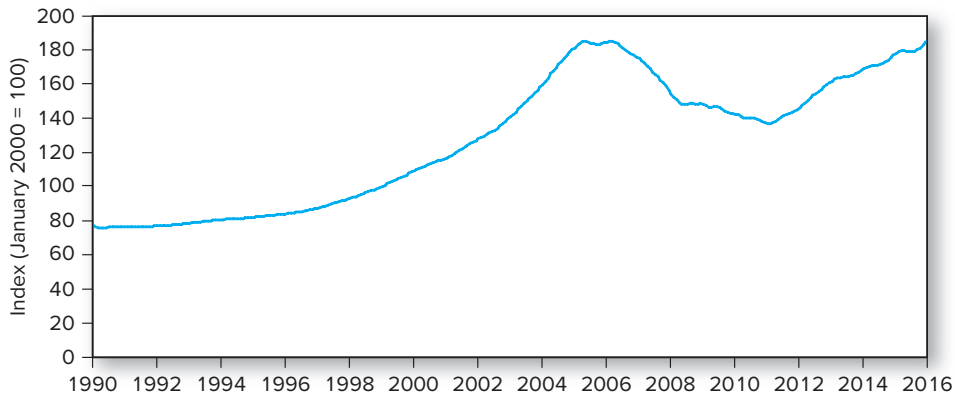

Figure 1.3 The Case-Shiller index of U.S. housing prices

compared to past experience. Some observers wondered whether we had entered a golden age for macroeconomic policy in which the business cycle had been tamed.

The combination of dramatically reduced interest rates and an apparently stable economy fed a historic boom in the housing market. Figure 1.3 shows that U.S. housing prices began rising noticeably in the late 1990s and accelerated dramatically after 2001 as interest rates plummeted. In the 10 years beginning in 1997, average prices in the U.S. approximately tripled.

But the newfound confidence in the power of macroeconomic policy to reduce risk, the impressive recovery of the economy from the high-tech implosion, and particularly the housing price boom following the aggressive reduction in interest rates may have sown the seeds for the debacle that played out in 2008. On the one hand, the Fed's policy of reducing interest rates had resulted in low yields on a wide variety of investments, and investors were hungry for higher-yielding alternatives. On the other hand, low volatility and optimism about macroeconomic prospects encouraged greater tolerance for risk in the search for these higher-yielding investments. Nowhere was this more evident than in the exploding market for securitized mortgages. The U.S. housing and mortgage finance markets were at the center of a gathering storm.

Changes in Housing Finance

Prior to 1970, most mortgage loans would come from a local lender such as a neighborhood savings bank or credit union. A homeowner would borrow funds for a home purchase and repay the loan over a long period, commonly 30 years. A typical thrift institution would have as its major asset a portfolio of these long-term home loans, while its major liability would be the accounts of its depositors. This landscape began to change when Fannie Mae (FNMA, or Federal National Mortgage Association) and Freddie Mac (FHLMC, or Federal Home Loan Mortgage Corporation) began buying mortgage loans from originators and bundling them into large pools that could be traded like any other financial asset. These pools, which were essentially claims on the underlying mortgages, were soon dubbed mortgage-backed securities, and the process was called **securitization.** Fannie and Freddie quickly became the behemoths of the mortgage market, between them buying around half of all mortgages originated by the private sector.

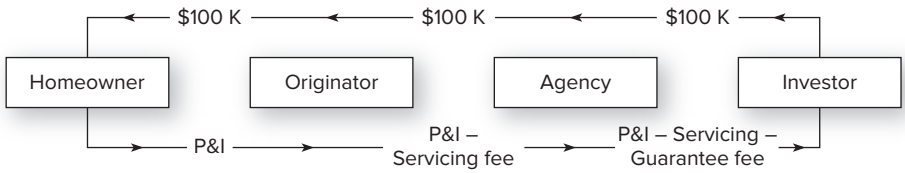

Figure 1.4 Cash flows in a mortgage pass-through security

Figure 1.4 illustrates how cash flows passed from the original borrower to the ultimate investor in a mortgage-backed security. The loan originator, for example, the savings and loan, might make a $100,000 home loan to a homeowner. The homeowner would repay principal and interest (P&I) on the loan over 30 years. But then the originator would sell the mortgage to Freddie Mac or Fannie Mae and recover the cost of the loan. The originator could continue to service the loan (collect monthly payments from the homeowner) for a small servicing fee, but the loan payments net of that fee would be passed along to the agency. In turn, Freddie or Fannie would pool the loans into mortgage-backed securities and sell the securities to investors such as pension funds or mutual funds. The agency (Fannie or Freddie) typically would guarantee the credit or default risk of the loans included in each pool, for which it would retain a guarantee fee before passing along the rest of the cash flow to the ultimate investor. Because the mortgage cash flows were passed along from the homeowner to the lender to Fannie or Freddie to the investor, the mortgage-backed securities were also called *pass-throughs.*

Until the last decade, the vast majority of securitized mortgages were held or guaranteed by Freddie Mac or Fannie Mae. These were low-risk *conforming* mortgages, meaning that eligible loans for agency securitization couldn't be too big, and homeowners had to meet underwriting criteria establishing their ability to repay the loan. For example, the ratio of loan amount to house value could be no more than 80%. But securitization gave rise to a new market niche for mortgage lenders: the "originate to distribute" (versus originate to hold) business model.

Whereas conforming loans were pooled almost entirely through Freddie Mac and Fannie Mae, once the securitization model took hold, it created an opening for a new product: securitization by private firms of *nonconforming* "subprime" loans with higher default risk. One important difference between the government agency pass-throughs and these so-called private-label pass-throughs was that the investor in the private-label pool would bear the risk that homeowners might default on their loans. Thus, originating mortgage brokers had little incentive to perform due diligence on the loan *as long as the loans could be sold to an investor.* These investors, of course, had no direct contact with the borrowers, and they could not perform detailed underwriting concerning loan quality. Instead, they relied on borrowers' credit scores, which steadily came to replace conventional underwriting.

A strong trend toward low-documentation and then no-documentation loans, entailing little verification of a borrower's ability to carry a loan, soon emerged. Other subprime underwriting standards quickly deteriorated. For example, allowed leverage on home loans (as measured by the loan-to-value ratio) rose dramatically. By 2006, the majority of subprime borrowers purchased houses by borrowing the *entire* purchase price!

When housing prices began falling, these loans were quickly "underwater," meaning that the house was worth less than the loan balance, and many homeowners decided to walk away from their loans.

Adjustable-rate mortgages (ARMs) also grew in popularity. These loans offered borrowers low initial or "teaser" interest rates, but these rates eventually would reset to current market interest yields, for example, the Treasury bill rate plus 3%. Many of these borrowers "maxed out" their borrowing capacity at the teaser rate, yet, as soon as the loan rate was reset, their monthly payments would soar, especially if market interest rates had increased.

Despite these obvious risks, the ongoing increase in housing prices over the last decade seemed to lull many investors into complacency, with a widespread belief that continually rising home prices would bail out poorly performing loans. But starting in 2004, the ability of refinancing to save a loan began to diminish. First, higher interest rates put payment pressure on homeowners who had taken out adjustable-rate mortgages. Second, as Figure 1.3 shows, housing prices peaked by 2006, so homeowners' ability to refinance a loan using built-up equity in the house declined. Mortgage default rates began to surge in 2007, as did losses on mortgage-backed securities. The crisis was ready to shift into high gear.

Mortgage Derivatives

One might ask: Who was willing to buy all of these risky subprime mortgages? Securitization, restructuring, and credit enhancement provide a big part of the answer. New risk-shifting tools enabled investment banks to carve out AAA-rated securities from original-issue "junk" loans. Collateralized debt obligations, or CDOs, were among the most important and eventually damaging of these innovations.

CDOs were designed to concentrate the credit (i.e., default) risk of a bundle of loans on one class of investors, leaving the other investors in the pool relatively protected from that risk. The idea was to prioritize claims on loan repayments by dividing the pool into senior versus junior slices, called *tranches.* The senior tranches had first claim on repayments from the entire pool. Junior tranches would be paid only after the senior ones had received their cut.[7] For example, if a pool were divided into two tranches, with 70% of the pool allocated to the senior tranche and 30% allocated to the junior one, the senior investors would be repaid in full as long as 70% or more of the loans in the pool performed, that is, as long as the default rate on the pool remained below 30%. Even with pools composed of risky subprime loans, default rates above 30% seemed extremely unlikely, and thus senior tranches were frequently granted the highest (i.e., AAA) rating by the major credit rating agencies, Moody's, Standard & Poor's, and Fitch. Large amounts of AAA-rated securities were thus carved out of pools of low-rated mortgages. (We will describe CDOs in more detail in Chapter 14.)

Of course, we know now that these ratings were wrong. The senior-subordinated structure of CDOs provided far less protection to senior tranches than investors anticipated. When housing prices across the entire country began to fall in unison, defaults in all regions increased, and the hoped-for benefits from spreading the risks geographically never materialized.

Why had the rating agencies so dramatically underestimated credit risk in these subprime securities? First, default probabilities had been estimated using historical data from an unrepresentative period characterized by a housing boom and an uncommonly

[7]CDOs and related securities are sometimes called *structured products.* "Structured" means that original cash flows are sliced up and reapportioned across tranches according to some stipulated rule.

prosperous and recession-free macroeconomy. Moreover, the ratings analysts had extrapolated historical default experience to a new sort of borrower pool—one without down payments, with exploding-payment loans, and with low- or no-documentation loans (often called *liar loans*). Past default experience was largely irrelevant given these profound changes in the market. Moreover, the power of cross-regional diversification to minimize risk engendered excessive optimism.

Finally, agency problems became apparent. The ratings agencies were paid to provide ratings by the issuers of the securities—not the purchasers. They faced pressure from the issuers, who could shop around for the most favorable treatment, to provide generous ratings.

Concept Check **1.2**

When Freddie Mac and Fannie Mae pooled mortgages into securities, they guaranteed the underlying mortgage loans against homeowner defaults. In contrast, there were no guarantees on the mortgages pooled into subprime mortgage-backed securities, so investors were the ones to bear the credit risk. Were either of these arrangements necessarily a better way to manage and allocate default risk?

Credit Default Swaps

In parallel to the CDO market, the market in *credit default swaps* also exploded in this period. A credit default swap, or CDS, is in essence an insurance contract against the default of one or more borrowers. (We will describe these in more detail in Chapter 14.) The purchaser of the swap pays an annual premium (like an insurance premium) for protection from credit risk. Credit default swaps became an alternative method of credit enhancement, seemingly allowing investors to buy subprime loans and insure their safety. But in practice, some swap issuers ramped up their exposure to credit risk to unsupportable levels, without sufficient capital to back those obligations. For example, the large insurance company AIG alone sold more than $400 billion of CDS contracts on subprime mortgages.

The Rise of Systemic Risk

By 2007, the financial system displayed several troubling features. Many large banks and related financial institutions had adopted an apparently profitable financing scheme: borrowing short term at low interest rates to finance holdings in higher-yielding, long-term illiquid assets,[8] and treating the interest rate differential between their assets and liabilities as economic profit. But this business model was precarious: By relying primarily on short-term loans for their funding, these firms needed to constantly refinance their positions (i.e., borrow additional funds as the loans matured), or else face the necessity of quickly selling off their less-liquid asset portfolios, which would be difficult in times of financial stress. Moreover, these institutions were highly leveraged and had little capital as a buffer against losses. Large investment banks on Wall Street in particular had sharply increased leverage, which added to an underappreciated vulnerability to refunding requirements—especially

[8]*Liquidity* refers to the speed and the ease with which investors can realize the cash value of an investment. Illiquid assets, for example, real estate, can be hard to sell quickly, and a quick sale may require a substantial discount from the price at which the asset could be sold in an unrushed situation.

if the value of their asset portfolios came into question. Even small portfolio losses could drive their net worth negative, at which point no one would be willing to renew outstanding loans or extend new ones.

Another source of fragility was widespread investor reliance on "credit enhancement" through products like CDOs. Many of the assets underlying these pools were illiquid, hard to value, and highly dependent on forecasts of future performance of other loans. In a widespread downturn, with rating downgrades, these assets would prove difficult to sell.

This new financial model was brimming with **systemic risk,** a potential breakdown of the financial system when problems in one market spill over and disrupt others. When lenders such as banks have limited capital and are afraid of further losses, they may rationally choose to hoard their capital instead of lending it to customers such as small firms, thereby exacerbating funding problems for their customary borrowers.

The Shoe Drops

By fall 2007, housing price declines were widespread (Figure 1.3), mortgage delinquencies increased, and the stock market entered its own free fall (Figure 1.2). Many investment banks, which had large investments in mortgages, also began to totter.

The crisis peaked in September 2008. On September 7, the giant federal mortgage agencies Fannie Mae and Freddie Mac, both of which had taken large positions in subprime mortgage–backed securities, were put into conservatorship. (We will have more to say on their travails in Chapter 2.) The failure of these two mainstays of the U.S. housing and mortgage finance industries threw financial markets into a panic. By the second week of September, it was clear that both Lehman Brothers and Merrill Lynch were on the verge of bankruptcy. On September 14, Merrill Lynch was sold to Bank of America, again with the benefit of government brokering and protection against losses. The next day, Lehman Brothers, which was denied equivalent treatment, filed for bankruptcy protection. Two days later, on September 17, the government reluctantly lent $85 billion to AIG, reasoning that its failure would have been highly destabilizing to the banking industry, which was holding massive amounts of its credit guarantees (i.e., CDS contracts). The next day, the Treasury unveiled its first proposal to spend $700 billion to purchase "toxic" mortgage-backed securities.

A particularly devastating fallout of the Lehman bankruptcy was on the "money market" for short-term lending. Lehman had borrowed considerable funds by issuing very short-term debt, called commercial paper. Among the major customers in commercial paper were money market mutual funds, which invest in short-term, high-quality debt of commercial borrowers. When Lehman faltered, the Reserve Primary Money Market Fund, which was holding large amounts of (AAA-rated!) Lehman commercial paper, suffered investment losses that drove the value of its assets below $1 per share.[9] Fears spread that other funds were similarly exposed, and money market fund customers across the country rushed to withdraw their funds. The funds in turn rushed out of commercial paper into safer and more liquid Treasury bills, essentially shutting down short-term financing markets.

The freezing up of credit markets was the end of any dwindling possibility that the financial crisis could be contained to Wall Street. Larger companies that had relied on

[9]Money market funds typically bear very little investment risk and can maintain their asset values at $1 per share. Investors view them as near substitutes for checking accounts. Until this episode, no other retail fund had "broken the buck."