

The U.S. Housing Collapse
and the Financial Crisis of 2007-08

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The global macroeconomic recession that began in late 2008 and continued through most of 2009 was the deepest and most synchronized recession since the Great Depression of the 1930s. The origin of the recession was the collapse of U.S. house prices, which began in 2006 and continued for over two years. This collapse in prices, by causing losses in major financial institutions around the world, triggered a global financial crisis in 2007 which then led to macroeconomic recession in most countries.

A detailed understanding of the causes of the financial crisis requires a close examination of several aspects of the U.S. financial system, especially those related to the creation and selling of residential mortgages. Moreover, it requires understanding how these various aspects *interacted* to create serious problems in the global financial system. Most economists now look back in retrospect and agree that the financial crisis did not have one or even a few isolated causes; rather, it was the result of a complex collection of institutional arrangements, macroeconomic trends, and regulations that combined together to produce a dramatic outcome.

Our discussion is divided into four parts. First, we discuss several of the crucial microeconomic elements, from the basics of residential mortgages and securitization to a description of “regulatory arbitrage” and the “shadow” banking system. We then review some key macroeconomic pressures, in particular the role of expansionary monetary policy and a global savings glut, both of which had important effects on interest rates and incentives to expand mortgage and home sales. Next we discuss how, after U.S. house prices began their descent in late 2006, the various forces and institutional details interacted to exacerbate the fall in prices and create a tightening in credit markets, which ultimately progressed into a global financial crisis. Finally, we briefly discuss how policy makers around the world responded, not just to the financial crisis but also to the economic recession that followed in its wake.

Part 1. Four Crucial Microeconomic Elements

We now review four crucial micro elements of the overall story. It is difficult to appreciate the origins of the financial crisis without understanding how these pieces function individually and also how they fit together. They are: the basics of residential mortgages; the growing specialization in mortgage lending; the process of securitization; and “regulatory arbitrage” and rising leverage in the financial sector.

The Basics of Residential Mortgages

When individuals wish to purchase a home, which often costs several times’ their annual income, they generally have two choices. First, they can save a significant fraction of their income each year for many years, at which point they will have accumulated enough to purchase a home. In this case, even the thriftiest individuals with an average income would be unable to purchase an average home before reaching their forties or fifties. The second option is for the individual to borrow money from a lender, usually a commercial bank, and then regularly pay back the loan (plus interest) every month over a long period of time, typically 25-30 years. In this case, the individual is able to purchase a home as soon as his or her annual income is sufficient to permit the regular monthly payments. Such a loan is called a *residential mortgage*.

A traditional mortgage is a very simple contract. The bank lends the individual borrower enough money to cover most (typically 85-90 percent) of the purchase price of the house, the rest being provided as a *down payment* by the individual. The *interest rate* for the mortgage is typically set for a term of 3-5 years, so that every few years the interest rate can be adjusted to reflect recent changes in overall market interest rates. As *collateral* on the loan, the individual offers to the bank the newly purchased house; in the event the individual stops making the regular monthly mortgage payments, the bank can *foreclose* on the mortgage and take the collateral. In this case, the bank would then own the house, and would typically try to sell it to reclaim as much as possible of the original loan amount. Most residential mortgages in the United States are *non-recourse* mortgages, meaning that if the individual fails to make the mortgage payments, the bank is unable to lay claim to any other assets the individual may own, such as a car, a vacation home, or financial assets such as stocks, bonds, or bank deposits.

The benefits of the mortgage to the individual borrower are clear: the individual is able to purchase a house much earlier than if he or she had to save the entire amount before purchasing. The bank benefits as well, by earning interest on the mortgage loan. Banks usually raise funds by accepting deposits from firms and individuals, and the banks pay relatively low interest rates to attract those deposits. By then lending those same funds out at higher interest rates, the banks earn a profit. But banks making residential mortgages are generally careful to lend only to those borrowers deemed to be relatively low risks, and thus likely to honour their obligations to repay the principal and interest specified in the mortgage contract. Individuals with poor employment prospects, low or erratic income paths, or histories of not repaying past loans are unlikely to get a mortgage from a commercial bank, and thus are unlikely to be able to purchase a house.

The Growing Specialization of Mortgage Lending

Traditionally, the commercial bank providing a mortgage loan to an individual would keep the mortgage as an asset on its balance sheet. The mortgage represents an asset for the bank because it generates a regular stream of income—each monthly receipt representing the payment of interest plus the repayment of a small part of the original principal. In this case, the bank would take considerable care to offer mortgages only to those individuals likely to be able to repay the loan. This traditional model of residential mortgages is referred to as the *originate-to-own* model because the bank's intention in making the mortgage is to own the mortgage until the loan is completely repaid, typically 25-30 years.

Notice that the commercial bank is carrying out two different functions with the originate-to-own approach to residential mortgages. First, it is finding and evaluating a potential mortgage customer and then providing a mortgage to that person. Second, by adding this new mortgage to its existing stock of assets, it is building a portfolio of income-earning assets which likely includes residential and commercial mortgages, car loans, personal lines of credit, business loans, and corporate and government securities.

It is not surprising that commercial banks eventually came to recognize that these two different functions require different sets of skills and knowledge, and thus there were potential gains from increased specialization. The skills required for finding and assessing a promising mortgage customer are quite different than the skills required for assembling and managing a diversified portfolio of assets.

In recent years, therefore, many commercial banks and other mortgage lenders in the United States and elsewhere began adopting a different model for making residential mortgages. Rather than holding the mortgages in their portfolio of assets until they were fully repaid, many commercial banks chose instead to sell the mortgages to other financial institutions in return for cash. (Extreme specialists in this part of the process are known as *mortgage brokers* who focus on matching potential home buyers with appropriate mortgages, and receive a fee for doing so from the bank that extends the mortgage.) This approach is known as the *originate-to-distribute* model of residential mortgages, and is based on the benefits from specializing in the initial creation of mortgages. At the same time, other institutions specialized in the second function, that of assembling and managing complex portfolios of different kinds of income-earning assets, including residential mortgages. We focus for now on the institutions specializing in the creation of residential mortgages. In the next section we discuss the institutions that purchase these mortgages.

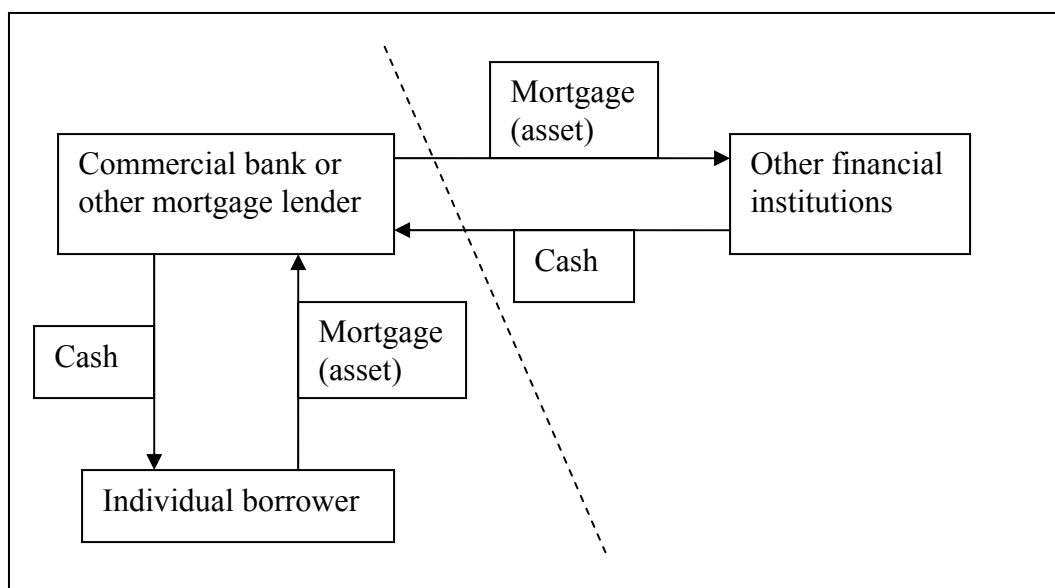
With the originate-to-distribute approach, the commercial banks making the mortgages no longer earn their profits from the interest payments on the mortgage, which accrue only over long periods of time. Instead, their profits come from the immediate fees built into the price at which they sell the mortgage to other financial institutions. For example, if a commercial bank provides you with a mortgage loan of \$200,000, it may then sell that asset to another institution for \$205,000, thus earning \$5,000 in fees which, after paying for the administrative and other costs involved in making the loan, hopefully leaves a positive contribution to the bank's profits. (The institution purchasing the mortgage is prepared to pay \$205,000 for the asset because it now owns an additional income-earning asset for which it did not have to incur costs to create. It can then add this new mortgage to its large portfolio of assets; we will discuss this in detail later.)

These two approaches to residential mortgages are shown in Figure 1. To the left of the dashed line we see the originate-to-own approach, with the commercial bank lending money to the individual and receiving (and keeping) the mortgage asset. The originate-to-distribute approach adds the rest of the diagram, so that the commercial bank then sells the mortgage asset to another financial institution in return for cash.

The originate-to-distribute model of residential mortgages has two interesting implications. First, because the commercial bank providing the mortgage does not keep the asset, but instead sells it in return for cash, the bank once again has cash available with which to make

new mortgages. Indeed, if every new mortgage is sold for cash, the bank has a never-ending incentive to make new loans: since the bank's profits come only from the fees it charges to make each mortgage, it would like to create and sell as many mortgages as possible. In contrast, under the originate-to-own model, the commercial bank retains the mortgages as income-earning assets and thus eventually runs down its cash reserves to the point where it can no longer make mortgages (until it raises new funds by accepting new deposits or borrowing). Thus, we can say that the originate-to-distribute approach provides greater incentives for the creation of new mortgages than does the originate-to-own approach.

Figure 1. Specialization in Mortgage Lending



The second implication is that, because the commercial bank does not hold the mortgage on its books for an extended period of time, it may have a reduced incentive to carefully assess the riskiness of any individual mortgage customer (borrower). For example, if the borrower has a patchy employment record or has a poor credit history a commercial bank may be unwilling to provide a mortgage in the traditional originate-to-own model because there is too little chance that the borrower will be able to make the necessary repayments over the entire length of the mortgage contract. In contrast, with the originate-to-distribute approach, the commercial bank may be willing to provide a mortgage to such a risky borrower, but only because it intends to sell the mortgage immediately to another institution—thereby “off-loading” any risks to it. (Of

course, this raises the question of why the purchasing institution would be willing to purchase such a risky mortgage; we will say more on this important point later.)

The Rise of “Securitization”

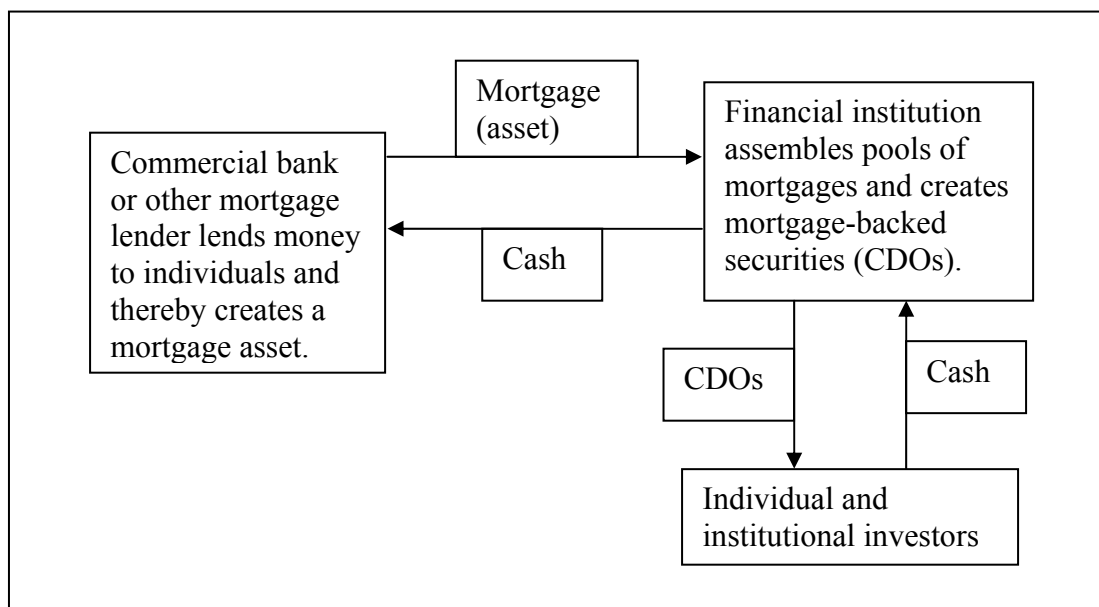
In the previous section we spoke of commercial banks specializing in the *creation* of mortgages but then selling those mortgages to other financial institutions. We now address the second part of this process—the financial institutions specializing in the construction and redistribution of large and complex portfolios of various assets. A crucial process used by these financial institutions is *securitization*, the creation of relatively low-risk assets (securities) from a large and diversified pool of higher-risk assets. The process of securitization has existed for several decades, but during the 1990s it became increasingly common in the United States to apply it to large pools of residential mortgages.

To understand the process, first consider the risks associated with owning any specific residential mortgage as an asset. First, there are the risks associated with the individual borrower—the likelihood that he or she loses a job or experiences some other event which leads to non-repayment of the mortgage. These are the *individual risks*, and are very different across different individual borrowers. Second, there are risks associated with the state of the aggregate economy, such as the likelihood of an economic recession or a decline in house prices, both of which may lead to non-payment of many residential mortgages. These are the *aggregate risks* and are broadly similar across a large number of individual mortgages.

Now imagine a financial institution that owns 100,000 residential mortgages, from individuals with different backgrounds, living in various regions of the country, and employed across various industrial sectors. Each individual mortgage is a relatively risky asset, for the reasons just explained. Yet the single large portfolio made up of the 100,000 mortgages is actually less risky than any of the individual mortgages because of the diversification of the portfolio. A famous statistical law called the *law of large numbers* tells us in this case that the individual risks for each mortgage tend to cancel each other out as long as the portfolio contains a very large number of mortgages. Across a very large group of people, one person’s good luck is very likely to be offset by another person’s bad luck.

To apply the process of securitization, the financial institution could then divide up the total portfolio into, for example, 100,000 equal shares. Each share would then be an income-earning asset (a security), backed by a very small share of a pool of 100,000 residential mortgages. What begins as 100,000 relatively risky residential mortgages evolves, through the process of securitization, into 100,000 well diversified and thus less risky mortgage-backed securities—assets that are backed by the stream of payments from a large number of residential mortgages.

Figure 2. The Securitization of Residential Mortgages



The financial institution that specializes in the *creation* of such mortgage-backed securities may then decide to sell these securities to investors (or other financial institutions) in return for cash, as shown in Figure 2. With the new cash, it is then able to purchase more mortgages from the commercial banks that originate them, assemble other large diversified pools of mortgages, and again apply the process of securitization to create new securities. In this case, the financial institution doing the securitization earns a profit by selling the mortgage-backed securities for more than what it originally paid for the total of the individual mortgages. This is possible because the mortgage-backed securities are lower-risk assets than the individual mortgages, and thus investors are prepared to pay a higher price to purchase them. The financial institution is creating genuine value (for which it earns profits) through the pooling of mortgages and the creation of mortgage-backed securities. Such mortgage-backed securities are a specific example of what in recent years became known as *collateralized debt obligations* (CDOs)

because the security represents an obligation (on the part of the original mortgages borrowers) to repay a debt, and that debt is accompanied by collateral (the houses).

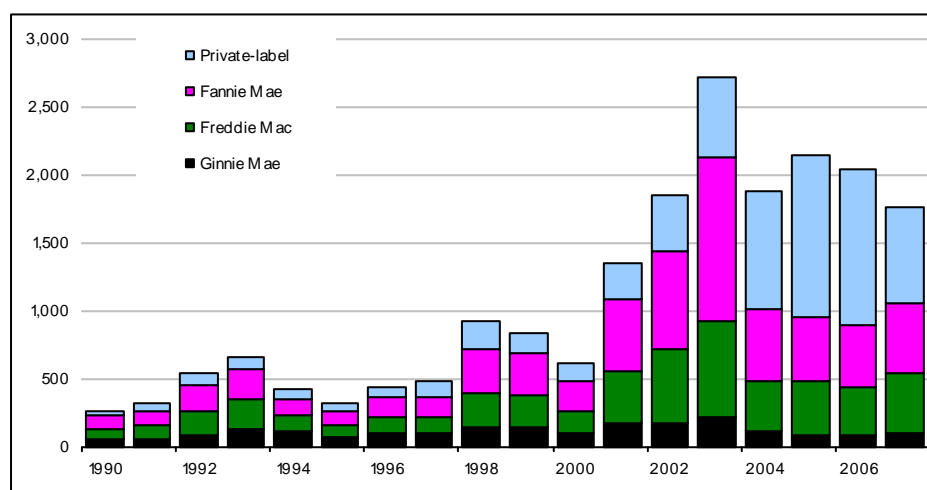
Two points are worth noting about the process of securitization. While the pooling of mortgages and the subsequent creation of the mortgage-backed securities does indeed reduce the riskiness of the individual CDOs sold to investors, this process *cannot eliminate all risk*. In particular, the law of large numbers ensures that the *individual* risks across the large number of mortgages tend to cancel out. But the pooling of mortgages in no way reduces the *aggregate* risks that tend to be the same for all of the mortgages. For example, the onset of a widespread economic recession, which tends to increase the number of workers in many sectors who become unemployed and thus lose their incomes, will still lead to the non-payment of many mortgages. Another example of an aggregate risk is a widespread decline in the price of houses, a possible event that figures prominently in our story to follow.

The second point is that the process of pooling the mortgages and creating mortgage-backed securities tends to make the riskiness of the final security difficult to assess for the investors purchasing them. The financial institution creating the securities presumably pays some attention to the riskiness of the mortgages that it purchases, but there is no realistic way to convey this massive amount of information to those investors purchasing the mortgage-backed securities. And in most cases, the investors will not choose to ask for this information; they are secure in the knowledge that they are purchasing a security backed by a diversified pool of a large number of mortgages. The financial institutions sometimes provide limited information about the riskiness of the underlying mortgages by dividing the mortgage pool into different risk “tranches” and then creating securities with different levels of risk. In this way, investors can purchase higher-risk and lower-risk mortgage-backed securities, with the purchase prices reflecting these different risk levels. In general, however, the process of securitization tends to make it more difficult for investors to accurately assess the true riskiness of the securities being purchased.

The complexity involved in assessing these underlying risks has led over the years to another important example of specialization in financial markets. The *raison d'être* of credit-rating organizations such as Moody's and Standard and Poor's is to evaluate the riskiness of government and corporate securities and convey this information to potential investors through a system of credit ratings. Despite the fact that the process of securitization could not possibly

eliminate the aggregate risks of the residential mortgage assets, many of the mortgage-backed securities received AAA credit ratings, indicating risk levels equivalent to the safest government bonds. In retrospect, many observers have alleged that the credit-rating agencies had a conflict of interest because they were earning their fees from the institutions that initially issued the securities, and that their ratings were consequently suspect. Whether the credit-rating agencies were guilty of conflict or negligence or simply bad luck, it is now clear that many of these mortgage-backed securities received ratings that did not appropriately represent the true underlying riskiness of the assets. The result was a greater expansion of the process of securitization than would otherwise have been the case.

Figure 3. Issuance of U.S. Mortgage-Backed Securities



Source: International Monetary Fund, *Global Financial Stability Report*, October 2009.

Figure 3 shows the rise of securitization in the United States between 1990 and 2007. During the early 1990s, \$300-\$500 billion in mortgage-backed securities were issued each year, but within a decade the annual amount had quadrupled to roughly \$2 *trillion* in newly issued securities. Part of this increase reflected the rising volume of new homes being purchased in the United States during this time, and thus the increase in the volume of new residential mortgages. But most of the increase in Figure 3 reflects the issuance of new mortgage-backed securities created from pre-existing home mortgages, and thus really represents the spread of the process of securitization rather than the expansion of the housing market itself.

Notice also in Figure 3 the roles played in the securitization process by the three firms known as *Fannie Mae*, *Freddie Mac* and *Ginnie Mae*. These firms (each with longer and less interesting proper names!) are examples of *state-sponsored enterprises* because of their close relationship to the U.S. federal government. Their primary purpose over many years has been to facilitate Americans' purchases of homes by buying mortgages from commercial banks and thereby keeping them highly liquid and able to extend more residential mortgages. They would then either hold the mortgages on their own books or securitize them and sell the resulting mortgage-backed securities to interested investors. As shown in Figure 3, these three state-sponsored enterprises were responsible for issuing roughly half of the securitized assets emanating from the U.S. housing market over the past fifteen years.

Regulatory Arbitrage and Rising Leverage

For two reasons, the process of securitization and the creation of the complex mortgage-backed securities moved away from commercial banks and toward other financial institutions. One reason is the specialization that we have already discussed: the skills required to find and assess promising prospects for mortgage customers are different from those required to assemble large pools of residential mortgages and create the CDOs through the process of securitization. Many U.S. commercial banks and other mortgage lenders (which are often very small and exist only in small regional markets) specialized in the creation of mortgages, content to then sell these mortgages to other (often larger) financial institutions.

Perhaps a more important reason, however, is the different regulations faced by commercial banks and other types of financial institutions. In the United States, the defining feature of commercial banks is that they accept deposits from individuals and firms. For reasons that originate in the Great Depression of the 1930s (when the failure of many U.S. commercial banks was followed by a financial crisis and a large and protracted fall in economic activity), commercial banks in the United States are now required to hold significant amounts of *capital* (mostly cash reserves and shareholders' equity) against their risky loans. The holding of adequate capital means that even if the bank's riskier assets suddenly decline in value, the bank will still be able to pay off its debts and thus will not become insolvent or risk going bankrupt. The reduced likelihood of insolvency, in turn, makes depositors more willing to keep their money in the bank,

thus further enhancing the bank's financial position. (The presence of deposit insurance also increases the safety of commercial banks in the eyes of the depositors.)

Financial institutions that do not accept deposits, however, face less stringent regulations in the United States, especially regarding capital requirements. And there are clear advantages associated with being permitted to hold less capital. Though holding capital does reduce the likelihood of the financial institution becoming insolvent in the event of a sudden decline in asset values, it also reduces the institution's profitability because it reduces the amount of interest-earning loans that can be made. In the midst of a strong economy with generally rising asset prices, the benefits of holding less capital (and thus making more loans) are clear. It is only in the event of asset-price declines that the benefits from holding more capital become obvious.

The existence of weaker regulations on non-deposit-taking financial institutions thus led to what economists call *regulatory arbitrage*—the idea that firms conducting specific types of transactions chose to locate themselves in institutions where the regulations were most amenable to the creation of profits.

Securitization is a process especially attractive for institutions with low capital requirements because the institution is then able to finance its operations largely from borrowed money rather than from the financial capital that owners have committed to the firm. The financial institution can issue bonds and sell them to interested investors (creditors). With the cash so raised, the institution can purchase a large number of residential mortgages, create the required mortgage pools, and then apply the process of securitization to create the mortgage-backed securities. It then sells these securities for more than it paid for the underlying mortgages, pays salaries to its employees and the required interest to its creditors, and whatever money is left is the financial institution's profit. Note that all of this is possible with very little of the owners' financial capital—in other words, the entire operation can be based largely on borrowed funds, or what is called *leverage*.

With the rise of the securitization of residential mortgages in the United States in the 1990s, and the existence of these important regulatory differences between commercial (deposit taking) banks and other financial institutions, it was only a matter of time before more and more of the securitization was being performed outside the traditional commercial banking sector. Instead, it was becoming centered on what we now call the “shadow” banking sector, the large number of financial institutions that are similar to commercial banks in many respects but

different enough that they face different regulations, especially with regard to capital requirements. For example, *investment banks* are institutions that act as intermediaries between borrowers and lenders, and that create and sell financial assets, but do not accept deposits. Their funds come mainly from the fees they charge for their intermediation services and from the issuance of corporate paper (short-term bonds). In some cases, the commercial banks created new institutions that operated independently but were established specifically to carry out the profitable activities of securitization. These are referred to as *structured investment vehicles* (SIVs) and because they were independent of the commercial banks they were not subject to the same regulations on capital requirements. Such SIVs are sometimes referred to as *off-balance-sheet entities* because their operations did not appear on the balance sheets of the commercial banks who owned them.

As the securitization of residential mortgages expanded dramatically in the 1990s and 2000s, and as financial institutions took advantage of the lighter regulations within the shadow banking sector, the number of financial institutions (and SIVs) conducting large-scale securitization also expanded. Since these institutions tend to hold less capital than traditional commercial banks, and thus are more highly leveraged because their operations are financed with borrowed money, it follows that the overall degree of leverage in the U.S. financial sector increased significantly. Among the U.S. investment banks, the average leverage ratio—total assets as a multiple of bank capital—increased from 22 in the early 2000s to 28 in mid-2007. Put differently, by 2007 these investment banks held only 3.5 percent of their assets in the form of capital.

In a world in which asset values are steadily rising, a highly leveraged financial institution can be incredibly profitable, for the simple reason that the funds borrowed at low rates of interest are used to create and sell assets with rising values. In such a world, the emphasis on borrowed funds permits the firm to generate enormous rates of return on the owners' initial capital investment. But the power of leverage to generate massive profits is also its power to accentuate financial losses, as we will soon see in a world where asset values are suddenly falling.

Part 2. Two Key Macroeconomic Pressures

Having described the four crucial micro elements of the U.S. housing and mortgage market, we are now ready to turn to the key macroeconomic pressures in place for several years preceding the financial crisis. In particular, two macroeconomic forces played a leading role in the dramatic events to follow: expansionary monetary policy and a global “glut” of saving.

Expansionary Monetary Policy

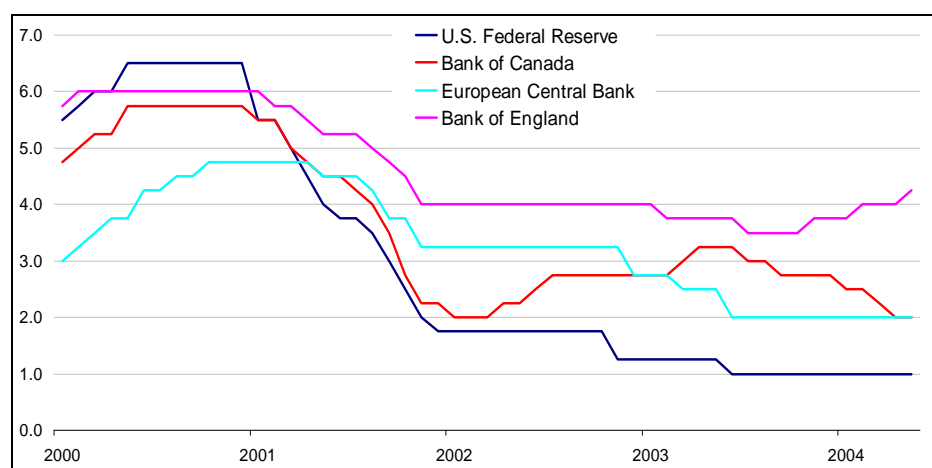
Two events in the opening years of the 21st century led to a substantial change in U.S. monetary policy. First, a large decline in stock-market prices in 2000, especially centered on technology-related companies, led to fears of a significant slowdown in economic activity. The U.S. Federal Reserve responded to the “tech crash” by lowering its policy interest rate in an effort to stimulate aggregate investment and spending, thus offsetting the fall in spending that often accompanies large and sudden price declines in the stock market. As it turned out, the United States still experienced a brief and modest recession late in 2000 and 2001.

The second event, on September 11, 2001, was the coordinated terrorist attacks in New York, Washington, and Pennsylvania. This event created havoc in the world’s financial markets, for two reasons. First, the attacks led to the collapse of the twin towers of the World Trade Center, which for years had been a global symbol of the importance of financial markets to the world economy. Second, the attack led people all over the world to wonder what other, possibly worse, events would follow; such uncertainty badly damaged the investment environment.

In the fall of 2001, therefore, there were serious concerns related to the possible onset of a major economic recession, caused not from the direct effects of the terrorist attacks on people or property but rather from the massive decline in confidence and increase in uncertainty that the attacks generated. As we explain in detail in Chapters 28 and 29 of the textbook, central banks usually view their main objective as the maintenance of low and relatively stable inflation. The decline in aggregate demand predicted to follow the dramatic events in the fall of 2001 would create an economic recession and eventually reduce the rate of inflation. The U.S. Federal Reserve, along with many other central banks around the world, responded with large and sustained declines in their policy interest rates, as shown in Figure 4. For the next three years, monetary policy remained highly expansionary with very low policy interest rates; only in late

2004 did the U.S. Fed begin any notable rate increases, in anticipation of the rise in inflationary pressures that would likely be generated by a fast-growing economy.

Figure 4. Central Bank Policy Interest Rates, 2000-2004



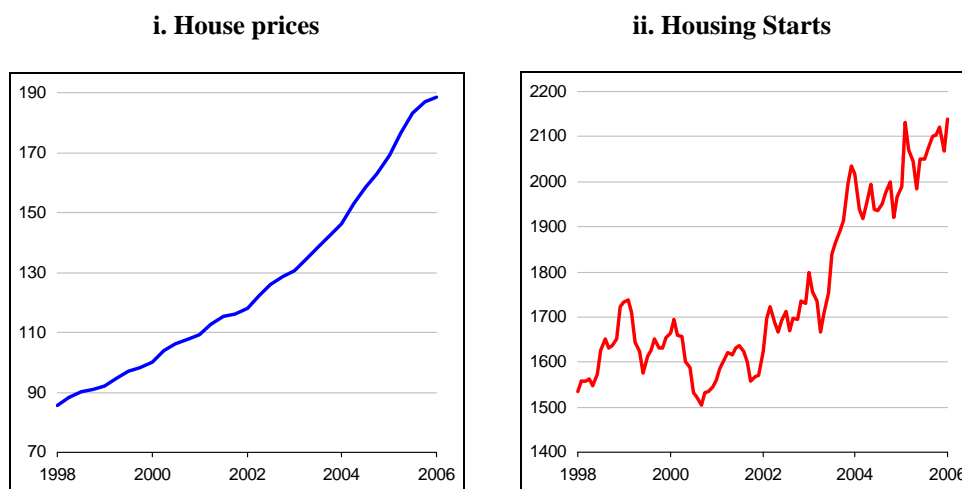
Sources: Bank of Canada, U.S. Federal Reserve, European Central Bank and Bank of England.

The interest-rate reductions implemented by the Federal Reserve were designed to stimulate aggregate expenditure by lowering the cost of credit to firms and households alike. During the 2002-2006 period, it appears that the Fed's policies were very effective. The growth of business credit during this period averaged about 6 percent per year while household credit was growing at over 10 percent annually. Another indicator that the Fed's policies were effective was the activity and prices observed in the U.S. housing market. Residential investment is probably the expenditure item for families that is the most sensitive to changes in interest rates for the simple reason that most families who purchase a house do so with credit—using a residential mortgage of the kind we discussed earlier. So the decline in the Fed's policy interest rate, which tended to push down all interest rates in a similar fashion, naturally induced many individuals and families to purchase homes. As a result, there was an increase in the number of homes being built during this period; and this increase in the demand for housing naturally tended to push up average house prices.

These trends are shown in the two parts of Figure 5. The left-hand side shows an index of average house prices, which more than doubled between 1998 and 2006, an annual average growth rate of almost 11 percent. The right-hand side of the figure shows annual housing

“starts”—the number (measured in thousands) of new houses for which construction commenced at that time. From 1998 to 2002, the annual number of housing starts varied around 1.6 million; but by 2006 the level of building activity had increased dramatically to over 2 million housing starts annually.

Figure 5. The Booming U.S. Housing Market, 1998-2006



Source: S&P/Case Shiller Home Price Index.
From Standard & Poor's; Fiserv; MacroMarkets LLC.

Source: U.S. Bureau of Economic Analysis.

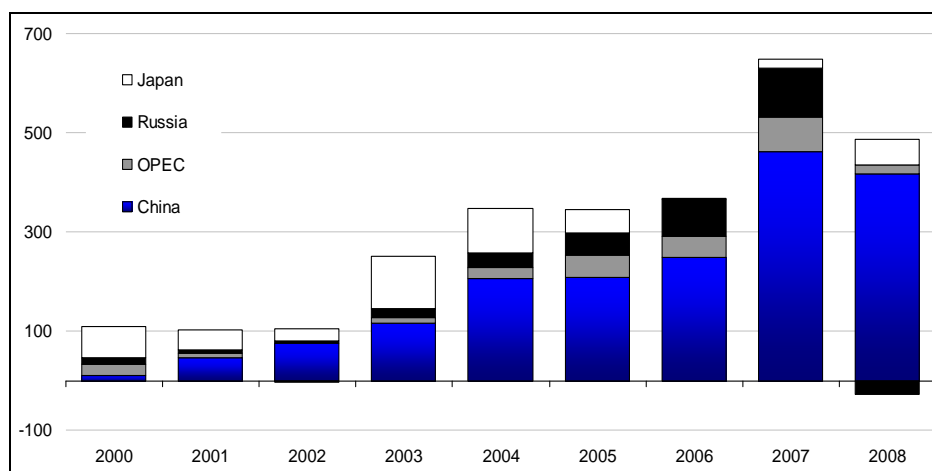
The Global Savings Glut

As we have just seen, expansionary U.S. monetary policy had the effect of keeping interest rates very low, and thus stimulating aggregate spending and especially investment in the U.S. housing market. As we now see, the second key macro pressure had a similar effect on interest rates, but for quite different reasons. In addition, this second pressure had its origins outside of the United States.

During the first few years of the 21st century, the largest of the Asian economies, especially Japan and China, began operating large *current account surpluses*, meaning that these countries became large and growing creditors to other countries, especially the United States. The flip side is that the United States was operating a large *current account deficit*, indicating that it was a net borrower from the rest of the world. There is still some disagreement about the precise cause of these current account “imbalances”. Some argue that, in China’s case, its policy of “fixing” its exchange rate at a level that makes Chinese products artificially inexpensive to global customers inevitably results in a large inflow of financial capital to the Chinese central

bank as the world purchases billions of dollars worth of low-price Chinese products. Others argue that U.S. households and governments spend so much, and save so little, that it is inevitable that the United States ends up borrowing from other countries whose residents typically spend much less and save much more, including Japan and China. Still others argue that the low U.S. saving rate during the early 2000s simply reflected the dynamism of the U.S. economy at the time; the world's savers chose to send their investment dollars to the United States because it was the best location in which to invest; but this flood of foreign saving reduced the need for American saving to finance local investment, thus liberating American households and firms to spend more of their income than would otherwise have been possible. Each of these causes for the current account imbalances is plausible and probably each is partly correct. In any event, the Asian economies had accumulated very large foreign-exchange reserves, as shown in Figure 6. China in particular experienced huge gains in its reserves; during the mid-2000s, the *increase* in China's official foreign-exchange reserves averaged roughly \$300 billion *per year*.

Figure 6. The Accumulation of Foreign-Exchange Reserves



Sources: International Financial Statistics data, September 2009, International Monetary Fund

At the same time, the early years of the new century saw a substantial increase in global commodity prices, including the world price of oil. In part, this increase reflected the usual connection between strong world economic growth, especially after 2003, and the growing demand for raw materials. The price increases during this period, however, were stronger than normal, as if some new force was propelling them upward. That new force was the economic

growth coming from the populous emerging economies of China and India, which had recently begun posting annual GDP growth rates between 8 and 10 percent. The world price of oil increased from about U.S. \$30 per barrel in the early 2000s to over U.S. \$100 per barrel in 2008.

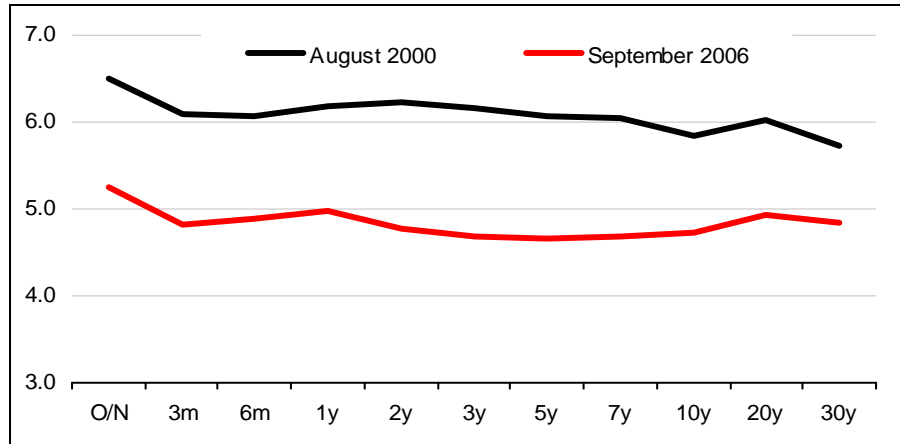
While a great many countries around the world produce a wide range of commodities, oil is produced by relatively few. And in the biggest oil-producing countries, the oil is owned, produced, and sold by government-owned firms. As a result, the significant increases in the world price of oil led to large increases in income for oil-producing countries, income that tended to be concentrated in the hands of the national governments. Since oil is transacted in international markets and invoiced in U.S. dollars, these oil earnings typically show up as foreign-exchange reserves of the oil-exporting countries.

As is clearly shown in Figure 6, the early years of this century thus witnessed an accumulation and concentration of foreign-exchange reserves, in the largest Asian economies and also in the oil-exporting countries. In general, governments can choose to hold such assets as cash (in the currency of their choice) or to invest them in interest-earning assets, such as government bonds. These governments typically chose the latter, and thus these financial assets contributed to a global increase in the supply of saving. As we see in Chapters 15 and 26 of the textbook, such an increase in the supply of saving tends to drive down interest rates: as these governments purchased short-term or long-term government bonds, the prices of the bonds increased, thus reducing the interest yield generated by the bonds. And since financial markets are highly globalized, this reduction in interest rates occurred in most countries.

The “Search for Yield” Drives Increased Risks

In summary, two macroeconomic forces were present in the several years before the onset of the financial crisis, both tending to depress global interest rates. Highly expansionary monetary policy, in many countries but especially in the United States, reduced short-term interest rates dramatically, and also had a negative effect on long-term interest rates. At the same time, the global savings glut led to an increased demand for government securities of all maturities, and thus contributed to a further reduction in interest rates. Figure 7 displays for the United States the change in the *yield curve* from August 2000 to September 2006, and shows that interest rates across the maturity spectrum declined significantly during this period, by slightly over a full percentage point. (Similar declines in interest rates occurred in most other countries.)

Figure 7. The Downward Shift in the U.S. Yield Curve



Source: Based on author's calculations using data from the U.S. Federal Reserve

In such a global environment of low interest rates, there inevitably arises a “search for yield” among investors seeking to make profitable financial investments. At any point in time, investments offering higher interest rates tend also to be riskier: the higher interest rate is the extra reward required by the investor in return for making a riskier investment. Global investors thus began searching for investments that offered higher returns, but without too much extra risk. Some higher risk was acceptable, but investors still hoped to find investments offering *substantially* higher returns with only *slightly* higher risk levels.

The securitized assets originating in the U.S. mortgage market, many of which received AAA ratings by the credit-rating agencies, were ideally suited to respond to this global search for yield, for they appeared to offer the rare combination of low risks and high returns. We make several observations.

The Allure of Mortgage-Backed Securities

As explained earlier, the mortgage-backed securities (CDOs) being created by the financial institutions specializing in the process of securitization were viewed as attractive investments. The diversification coming from the assembly of large pools of residential mortgages ensured that investors would not be exposed to the individual risks associated with the underlying mortgage customers. Though it might have been recognized that the process of diversification could not reduce the *aggregate* risks contained within the mortgages, the fact that U.S. house

prices had been rising by over 10 percent per year for several years encouraged many investors to believe that they would continue rising for the foreseeable future. And if U.S. house prices continued to rise, then the aggregate risks would be small enough to be ignored. The credit-rating agencies appear to have believed this as well, for many of the CDOs were rated as low-risk investments. As a result, individual and institutional investors, in the United States but also in many other countries as well, increased their demand for these CDOs. In response, the financial institutions creating them increased their demand for the two key inputs necessary for their production: credit and residential mortgages.

Rising Leverage for Financial Institutions

In order to produce and sell more CDOs, the investment banks and structured investment vehicles (SIVs) creating them increased their demand for loans—for the simple reason that these institutions financed much of their asset purchases with borrowed money. Their greater borrowing, achieved through the issuance of short-term bonds, added to their liabilities. The cash was then used to purchase new mortgages, which were then pooled and securitized, creating a fresh supply of mortgage-backed securities. Moreover, it was relatively easy for these financial institutions to raise new funds in this way, partly because the global savings glut provided a large supply of global financial capital in pursuit of promising investments, and partly because the booming U.S. housing market ensured that investments with any connection to the U.S. housing market appeared to be safe and profitable.

This new borrowing increased the leverage of the financial institutions and dramatically increased their profitability. On the one hand, their large and growing amount of debt was acquired at low interest rates. On the other hand, this borrowed money was used to purchase residential mortgages which were then turned, through the process of securitization, into diversified assets for which there appeared to be an unlimited demand. As long as interest rates remained low and U.S. house prices continued to rise, the securitization and marketing of mortgage-backed securities was a very profitable activity.

The Declining Quality of Mortgage Lending

As financial institutions increased their demand for residential mortgages with which to create securitized assets, the commercial banks and other mortgage lenders responded by searching for more mortgage customers. They attempted to expand their customer base by offering mortgages on terms and conditions that were more attractive to the individuals considering a house purchase. These new terms and conditions, however, inevitably attracted riskier borrowers. For example, the share of total residential mortgages being originated in the United States to “subprime” customers (those considered to be higher risks) increased significantly over the decade of the 2000s, from 8 percent in 2000-02 to 20 percent of all mortgages by 2004-06. In some cases, mortgages were even provided to people with no income, no job, and no assets—often referred to as “NINJA loans”.

Some mortgage lenders offered mortgages with “teaser” rates—low interest rates for the first two or three years of the mortgages, to be followed by significant rate increases thereafter. Such *adjustable-rate mortgages* (ARMs) may not appeal to customers who are significantly forward looking, but they may be very attractive to customers impatient to own a house and who care more about today than even the near future. Some mortgages were offered to borrowers who were unable or unwilling to make any down payment, in which case the value of the mortgage was equal to the entire value of the house being purchased (sometimes the size of the mortgage *exceeded* the value of the house so that the borrower could use the extra funds to purchase furniture and appliances for the new home). In other cases, mortgages were made more attractive by requiring the borrower to repay the interest but not the principal, thus reducing the size of the monthly mortgage payment.

Implicit Beliefs

For all of these examples of higher-risk mortgages, one can ask why the borrowers were so enthusiastic to go deeply in debt, especially in circumstances where repayment of the mortgage would be financially difficult. One can also ask why the mortgage lenders were so enthusiastic to provide mortgages to high-risk borrowers.

The enthusiasm of the borrowers appears to have been based on some combination of the “American Dream”—the desire for many people to own their own home—and the belief that

house prices in the United States would continue rising as they had been for several years. With house prices on a continual upward path, many risks can easily be tolerated. For example, suppose you purchase a house for \$200,000 with an interest-only mortgage. Your house then rises in price by 10 percent per year for three years, at which point you lose your job and become unemployed. If you are no longer able to make your monthly mortgage payments, you can sell the house for about \$233,000, pay the realtor's fees of \$13,000, pay off the mortgage for \$200,000, and pocket the remaining \$20,000. Examples like this helped many higher-risk borrowers come to the belief that they were not actually exposing themselves to significant risks. Indeed, many might have thought that they would be financially irresponsible *not* purchasing a home, thereby losing an opportunity to benefit from the booming U.S. housing market. Such a perspective was especially relevant for the many people who purchased homes purely as a speculative investment—hoping to re-sell the home after several months and earn large capital gains in the process.

To explain the enthusiasm of the mortgage lenders, note that the originate-to-distribute approach to mortgages means, as we discussed earlier, that the initial mortgage lenders have a greater incentive to ignore the risks of the borrowers, because any risk in the mortgages will be immediately “offloaded” to the financial institutions purchasing them. And these institutions may have been equally content to purchase such risky mortgages, partly because they knew that the risks would be offloaded to the final investors of the CDOs and partly because they probably overestimated the extent to which the process of securitization could reduce the inherent risks.

Overall, the enthusiasm of the entire chain of home buyers, mortgage lenders, financial institutions, and investors can be largely explained by the economic context of the times—a fast-growing U.S. economy, low interest rates, and a booming U.S. housing market. As long as these conditions continued, the markets for mortgages and mortgage-backed securities were very profitable and appeared to be very safe. As long as these conditions continued, what could possibly go wrong?

Feedback Effects and the Global Spread of Risk

We have explained how the global “search for yield” was an important force leading to the demand by investors for secure assets with high rates of return. In the presence of rising U.S. house prices, mortgage-backed securities perfectly fit the bill. And so there was a resulting

increase in the global demand for such securities and, in turn, for the underlying residential mortgages. But as the mortgage lenders increased their provision of mortgages to those individuals and families purchasing homes, there were *feedback effects* onto both the housing market and the financial markets, both of which provided more momentum to the entire process.

The increase in U.S. mortgage lending (accomplished by easing the terms and conditions on the mortgages) implied an increase in credit to borrowers, facilitating an increase in the demand for houses. This helped to propel U.S. house prices still further on their upward path, and led also to further increases in the rate of new housing construction (look back to Figure 5).

The continuing boom in the U.S. housing market, in turn, made the securitization of residential mortgages more profitable and, for investors around the world, made the resulting mortgage-backed securities (CDOs) appear to be even better investments. Financial institutions therefore increased their borrowing—and thus their leverage—in order to purchase more mortgages from which they could produce more CDOs. Many investors also increased their borrowing—and thus their leverage—to finance their growing purchases of CDOs.

As this process continued through the early 2000s, with rising U.S. house prices and a significant expansion of the securitization of U.S. residential mortgages, the ownership of the mortgage-backed securities spread throughout the world, to individual and institutional investors in many countries. The globalization of capital markets not only produced the global savings glut which helped to increase the allure of mortgage-backed securities, but it also ensured that these assets would be purchased by investors all around the world. The result was that the aggregate risks contained within millions of U.S. residential mortgages—the risks associated with economic recession or a collapse in U.S. house prices—were transferred to investors all around the world.

These aggregate risks also spread outside of the financial institutions that were holding the mortgage-backed securities. Specifically, many financial institutions sought to insure themselves against a decline in asset prices, and were able to find other institutions to provide such insurance. The most famous example is the company AIG (for American Insurance Group) who, through the creation and marketing of *credit default swaps* (CDSs), received premiums from financial institutions in return for providing insurance against declines in the market value of their risky portfolios. By so doing, some part of the aggregate risk was spread from the financial institutions holding the CDOs to the insurance companies providing the insurance.

Furthermore, due to the sophistication of the securitized assets (CDOs), it is unlikely that the individual investors, financial institutions, or insurance companies fully appreciated the riskiness of the assets they were purchasing (or insuring). They could easily understand that the process of securitization, applied to large and diversified pools of mortgages, would significantly reduce the individual risks of the underlying borrowers; they might not have fully appreciated, however, that this diversification could not reduce or eliminate the relevant *aggregate* risks, those shared by all the borrowers because they apply to the country as a whole. Indeed, investors may have come to the belief that they had appropriately considered all relevant risks, partly because the financial institutions creating the CDOs offered different “tranches” of risk levels with different asset prices reflecting those differences, and partly because the major credit-rating agencies attached ratings to these CDOs which indicated low levels of risk.

Many observers argue that government policy was partly to blame for driving what eventually came to be seen as reckless risk-taking in financial markets. Some argue that monetary policy was too expansionary for too long a period, keeping interest rates low and thus propelling the U.S. housing market and the demand for residential mortgages to undesirable heights. To this is added a critique of U.S. tax policy because it allows home owners to deduct mortgage interest payments from taxable income, thereby further stimulating housing demand. Others emphasize the unfortunate role played by the U.S. government’s encouragement of Fannie Mae and Freddie Mac in having lax standards regarding the mortgages that they would purchase, thus simultaneously driving upwards the supply and increasing the riskiness of residential mortgages.

In retrospect, it is now easy to see that the entire process involved a pervasive *underpricing of risk*, meaning that the investors and credit-rating agencies did not recognize the full set of risks contained in these securitized mortgage assets. Had they been more aware of these risks, they would probably have been less likely to purchase them, or would at least have been prepared to pay significantly lower prices for them. At the time, however, with house prices rising and assets returning good rates of return, such a mis-pricing of risk was anything but clear.

Part 3. Fatal Interactions: The Housing Collapse and the Financial Crisis

We have seen how the key macroeconomic pressures in the early 2000s interacted with the crucial microeconomic elements of the U.S. mortgage and financial markets to produce a

situation in which house prices in the United States were rising quickly, global investors were actively purchasing securities backed by U.S. residential mortgages, financial institutions were becoming increasingly leveraged and profitable, and each part of this overall process appeared to be feeding back on the others, fueling the process even further.

In late 2006, however, the process stopped suddenly when U.S. house prices first slowed, and then began an absolute decline, which many people refer to as the bursting of the U.S. housing “bubble”. Bubbles are said to occur in specific asset markets when the prices of the assets appear to be rising for reasons unconnected to increases in their underlying “fundamental” values. It is usually very difficult to define precisely these “fundamental” values, however, and thus it is also difficult to identify asset bubbles when they are still expanding. This is a point of considerable contention among economists.

For the purposes of this discussion, however, it is unnecessary to debate the existence of asset bubbles or their bursting. A few simple facts are uncontested. Between 2002 and 2006, the average U.S. house price increased at rates between 8 and 15 percent per year. Early in 2006, this growth rate slowed sharply, and in the late fall of that year, prices began falling. During 2007, average house prices fell by 10 percent; during 2008, prices fell by another 20 percent. Whether or not there was a bursting of a genuine “bubble” in the U.S. housing market, there was unquestionably a *collapse* in U.S. house prices.

With the slowdown and absolute decline in U.S. house prices, the crucial micro elements and key macro pressures that we have discussed interacted to accentuate the price decline in the U.S. housing market, create a severe tightening in global credit markets, and produce the first major global financial crisis in over half a century. Consider the following elements of the overall progression of events.

Rising Mortgage Foreclosures

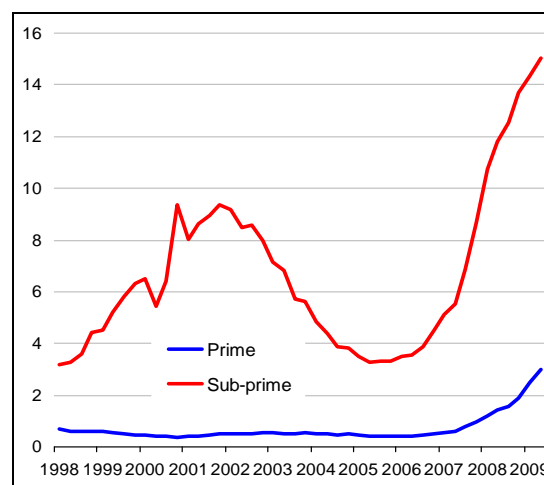
As the prices of U.S. homes began to fall in late 2006, many individual borrowers who had purchased homes over the previous few years were confronted with a difficult choice. In situations where their down payments had been only a very small fraction of the purchase price of the house, they had very little *equity* in their house—the difference between the current market value of their house and the amount they owe on the mortgage. With large declines in house

prices, however, some homeowners soon had *negative* equity because the market value of their house was less than the amount still owing. In these situations—when it is sometimes said that homeowners are “under water”—the homeowner has an important decision to make.

One option is to recognize that the decline in the house’s value is unlikely to last for longer than a few years, and that over the longer term it still makes sense to own the home and thus to continue making the regular monthly mortgage payments. This choice is easier, of course, if the homeowner’s individual economic situation, especially their employment status and income, has not deteriorated; in this case, the individual is under no immediate financial pressure to sell the house.

The second option is to take a shorter-term view and recognize that the negative equity now provides an incentive to stop making the monthly mortgage payments and to simply “walk away” from the house. By doing so, the homeowner eliminates a large financial liability but also eliminates the associated asset (the house). In this case, the commercial bank or other financial institution holding the mortgage will *foreclose* on the individual and take ownership of the house, which was initially offered as collateral for the mortgage loan. This decision, which might seem rash for a borrower with unchanged employment and income, is much easier to justify for a borrower who has recently lost a job or experienced a significant decline in income, and thus might be financially unable to continue making the mortgage payments.

Figure 8. Share of U.S. Mortgages in Foreclosure



Source: Mortgage Bankers Association of America

Beginning in the fall of 2006, and continuing through 2007 and 2008, many U.S. homeowners (especially the speculative buyers) found themselves confronted with this choice, and many of them chose to walk away from their homes. The result was that the rate of foreclosures on residential mortgages increased markedly, as shown in Figure 8. The increase in the rate of foreclosures on “sub-prime” mortgages was especially large. After commercial banks take ownership of foreclosed homes, they ordinarily attempt to recoup as much of their initial investment as possible, and they do this by attempting to sell the homes. With many commercial banks foreclosing on many mortgages, and most of these homes then being offered for sale, the predictable result is to increase the supply of homes on the housing market and thus *increase the rate of decline* of house prices. This leads to more homeowners experiencing negative equity, more people walking away from their homes, more foreclosures, more houses being offered for sale, and even further declines in the price of houses.

The Vanishing CDO Market

As we discussed earlier, many financial institutions specialized in the purchase of residential mortgages and the creation of securitized mortgage-backed securities. These securities (CDOs) were then marketed to individual and institutional investors in many countries, a process which spread the aggregate risks of the U.S. housing market onto individual and corporate balance sheets around the world.

With the sharp decline in U.S. house prices, and the rising foreclosures of residential mortgages, the CDOs suddenly lost much of their value. After all, the value of each CDO reflects nothing more than the value of the underlying streams of mortgage payments. But with foreclosed mortgages, the value of any given stream of mortgage payments is replaced with the value of the house itself, which in a collapsing housing market (and thus few interested buyers) is quite uncertain. As the housing collapse accelerated in 2007, therefore, the market for CDOs effectively vanished, meaning that there were so few traded that it was difficult to know the accurate market value on any given day.

The Need for “Deleveraging”

Many of the purchasers of the CDOs were financial institutions or structured investment vehicles (SIVs) that purchased the assets using borrowed funds, raised from the issuance of short-term bonds (corporate paper). Many of these institutions were thus highly leveraged, meaning that they had used little of their owners’ capital to finance their purchases, instead taking advantage of the widespread availability of short-term credit at low interest rates, a situation generated in part by the global savings glut discussed earlier.

The decline in the market value of the CDOs was an unfortunate challenge for any individual or institution holding these assets. For highly leveraged institutions, however, the challenge was magnified. Under standard “fair value” accounting rules, the value of a firm’s assets and liabilities must be measured according to the best available estimate of their current market value, usually indicated by the current market price—the values are, in other words, “marked to market”. As the market prices for CDOs first declined, and then the market more-or-less vanished altogether, these highly leveraged institutions were forced to value their assets at a tiny fraction of the price at which they had initially been purchased. At the same time, however, the value of their liabilities did not change, since these were mostly short-term bonds with fixed interest rates.

With large declines in the value of their net assets, these institutions therefore had massive “holes” in their balance sheets—holes that needed to be filled with injections of new money (cash reserves or shareholders’ equity). But in finding such new money, they appeared to be trapped by the conditions in the financial markets. Cash reserves can be increased either by more borrowing or by selling some existing assets. But these highly leveraged institutions were now reluctant to take on more debt, and their potential insolvency naturally made it difficult to find interested lenders. With the drying up of the CDO market, raising cash by selling CDOs would not be effective, partly because it would force the institutions to realize further losses on their books. This left increasing shareholders’ equity as the only realistic way of filling the holes in the balance sheet. Shareholders’ equity can be increased either by issuing and selling new shares to interested new investors, or by convincing the existing set of owners to inject new financial capital to the firm. In both cases, however, investors are reluctant to inject new capital in a firm unless they are convinced that the firm’s long-term prospects are positive, despite the massive current decline in the value of the firm’s assets.

In general, the decline in the market values of the mortgage-backed securities set in motion a difficult and painful process of “deleveraging” in many financial institutions around the world, as they strove to increase their capital and shed their debt. Unfortunately, the financing model adopted by many of these institutions—based on large volumes of borrowed money—would make the shedding of debt very difficult; and, unfortunately, the price of credit was about to rise sharply.

The Inevitable Credit Crunch

Many of the highly leveraged financial institutions whose asset values collapsed with the decline of the CDO market had based their firms’ financial models on the ready accessibility of short-term credit at low interest rates. For example, they issued 30-day and 90-day bonds to raise the funds necessary to finance the purchases of their assets. With a large amount of their debt held in such short maturities, the firms were regularly in the credit markets “rolling over” their debt: issuing new short-term bonds to raise the funds necessary to pay off the short-term bonds currently coming due. Thus, despite the desire on the part of many of these firms to “deleverage” by reducing their overall debt and raising more capital, they were also in a situation (and had been for several years) of requiring new credit on an ongoing basis.

At the same time, however, the supply of credit was quickly drying up. It was becoming increasingly apparent throughout 2007 that many financial institutions, in many countries, had purchased securitized assets based largely on U.S. residential mortgages. As the U.S. housing market collapsed and the market prices for the mortgage-backed CDOs declined, the solvency of these financial institutions started to come into question. In some cases, bankruptcy was a real possibility. An important complicating factor, however, was that it was not immediately clear which institutions had the greatest exposure to (ownership of) the highest-risk of these mortgage-backed securities, and thus which institutions were facing the greatest threat of bankruptcy. Moreover, the extreme complexity of the securitized assets themselves, which made it difficult to determine which securities were constructed from the riskiest mortgages, added further to the general uncertainty in the financial markets.

In this setting of extreme uncertainty, with many financial institutions close to insolvency and countless others considered to be probable candidates, the supply of credit declined markedly. The existence of considerable “counterparty risk” implied that creditors were

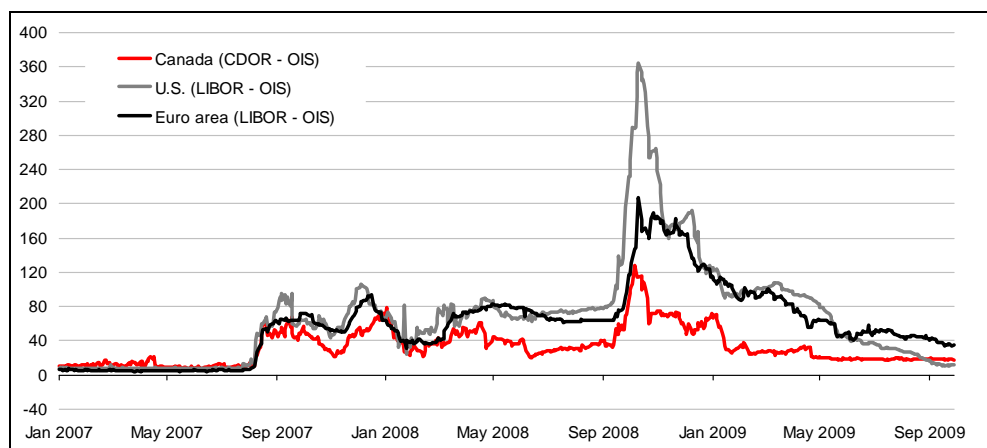
increasingly unsure about the credit-worthiness of institutional borrowers who until very recently had been highly regarded and viewed as very stable. To put it differently, creditors were unsure as to whether even short-term loans to these institutions would be repaid before a possible onset of bankruptcy.

With the continuing demand for short-term credit coming from the highly leveraged financial institutions, and the decline in the supply of credit driven by the rising counterparty risks, there was an inevitable “credit crunch”, a situation in which the price of credit (the interest rate) rises and the flow of credit declines. And this credit crunch occurred in many countries, not just in the United States.

One of the hallmarks of globalization is that financial capital moves relatively easily across international boundaries, and thus borrowers and lenders from many countries are effectively brought together to interact in a truly global market for credit. Since the risks contained in the securitized mortgage assets had spread to individual and institutional investors around the world, the credit crunch was a global one. Financial institutions in many countries experienced significant declines in their asset values, although there was a greater concentration of troubled financial institutions in the United States and the United Kingdom, where the institutions had been more aggressive in their purchases of the securitized CDOs. As a result, there was an ongoing demand for credit from these institutions to roll over their short-term debt obligations. Similarly, creditors around the world were alerted to the presence of counterparty risks, thus reducing the supply of credit worldwide. As a result, the credit crunch was a global phenomenon, with interest rates rising in a broadly similar manner in many countries.

Figure 9 shows three measures of the price of credit in Canada, Europe, and the United States, from January 2007 through September 2009. Each measure shows the “spread” between the interest rate that banks pay for funds and the risk-free rate on government bonds, and thus shows the availability of credit in the financial markets. Until the fall of 2007, these interest-rate spreads in the three economies were less than 20 basis points (one basis point is 1/100th of a percentage point), reflecting easy access to credit for financial institutions. For the next year, however, these spreads rose significantly to average about 60 basis points—this was the period of the “credit crunch”. (Following September 2008 and the failure of several large financial institutions, the spreads increased dramatically, reflecting a sharp reduction in the accessibility of credit; as we will now see, this is when the credit crunch evolved into a full financial crisis.)

Figure 9. Interest-Rate Spreads, 2007-2008



Source: Bloomberg. The rate on the overnight-indexed swap (OIS) is used as a proxy for expected overnight rates. LIBOR is the London Interbank Offered Rate. CDOR is the Canadian Dealer Offered Rate.

From Credit Crunch to Financial Crisis

Beginning in 2007 and proceeding well into 2008, the global credit crunch and the associated increase in interest rates was viewed by policymakers mostly as a short-term problem of inadequate *liquidity* among financial institutions. There was a widespread belief that if these institutions could shore up their cash reserves, either through borrowing or through new injections of shareholders' equity, their balance sheets could be temporarily repaired. It was also believed that when U.S. house prices soon stabilized and then began to gradually recover, the value of the assets held by these institutions would also recover, thus reversing the need for massive deleveraging and putting an end to the credit crunch. In this view, policymakers could respond (as we discuss shortly) to the credit crunch by temporarily providing the liquidity needed by the financial sector, thus helping the financial institutions to get through a temporary rough patch.

At the basis of this view, however, lay one key assumption and one key unknown. The key assumption was that house prices would soon stabilize. The key unknown was the extent to which financial institutions were exposed to what were soon called "toxic assets", the complex mortgage-backed securities that were quickly losing their values and for which the markets were all but disappearing. As 2007 turned into 2008, the first assumption became clearly false, as

house prices accelerated their decline. And with the continuing fall of house prices and the ongoing collapse of CDO values, more and more financial institutions were clearly in trouble.

In the spring of 2008, two prominent banks, Bear Stearns in the United States and Northern Rock in the United Kingdom, were on the edge of bankruptcy. Policymakers in the two countries, still believing that the problem was fundamentally one of inadequate liquidity, intervened to shore up these institutions. For Bear Stearns, the U.S. government, through the Federal Reserve, provided financial assistance for its absorption by another private institution. For Northern Rock, the U.K. government partially nationalized the bank by using taxpayers' funds to finance a capital injection, in return for a substantial ownership position. Following both of these interventions, many policymakers appeared to believe that the financial markets would gradually recover and the credit crunch would subside.

These policy interventions in the United States and United Kingdom sparked a debate about the potential dangers of using the powers of government to support failing financial institutions. On one side were those who argued the need to support failing institutions for the simple reason that their collapse may lead to the collapse of others, thus endangering the health of the entire financial system. On the other side were those who argued that government support (and thus the likelihood of support for other troubled institutions in the future) would merely encourage these institutions to continue their high-risk behaviour, thus increasing the chances that they would need to be supported by government action. This is what economists call *moral hazard*—the idea that the presence of insurance can often generate more risk-taking behaviour by the insured party. This debate still continues to rage among economists and policymakers.

As 2008 progressed, house prices continued to decline, CDO values continued to fall, and more and more financial institutions were on the edge of bankruptcy. By the end of September, 2008, what was once viewed as a problem of liquidity was revealed to be something quite different altogether. In the first week of September, the collapse of the giant mortgage firms Fannie Mae and Freddie Mac was prevented only by the infusion of billions of dollars from the U.S. Treasury. When the large U.S. investment bank Lehman Brothers went bankrupt a week later, it was immediately evident that many other financial institutions were in danger of being swept under. Lehman Brothers was a very large and highly leveraged institution, whose failure would mean its liabilities to countless other institutions would go unpaid. These losses, in turn, would likely cause more financial institutions to fail, thus extending the spread of losses to even

more institutions. These fears seemed to come true almost immediately when the huge insurance company AIG was on the verge of bankruptcy, and only massive financial infusions by the U.S. government and Federal Reserve kept it from disappearing altogether. Would banks and other financial institutions continue to tumble as in a game of dominos?

What was viewed in the spring of 2008 as a problem of *liquidity* was by the autumn of the same year seen as a problem of *systemic stability*. The fear apparent in global financial markets on the day following Lehman's collapse was that the stability of the entire banking system was threatened, not just because Lehman was "big" but also because it was highly "interconnected" with other financial institutions. As the month progressed, several other large U.S. commercial banks went bankrupt or were taken over by healthier banks. And the remaining investment banks, many of which were very short of capital, converted into traditional commercial banks, thus subjecting themselves to more stringent regulation but also becoming possible recipients of government financial assistance. The U.S. financial system was transformed virtually overnight. What began as a U.S. housing collapse in 2006, and evolved into a global credit crunch in 2007, had become by the fall of 2008 the first global financial crisis since the Great Depression.

The scale of the financial losses was enormous. Between the fall of 2007 and the fall of 2009, financial institutions around the world recorded "writedowns" (declines in the value of their assets) totaling U.S. \$1600 billion—slightly larger than Canada's entire annual GDP. Roughly two-thirds of this was in the United States, one-third in Europe, and a relatively small amount (about \$50 billion) in Asia. Not surprisingly, stock markets around the world also collapsed, reflecting the decline in market values of most firms, especially financial institutions. The major stock-market indexes in the United States and the United Kingdom fell by 40-50 percent between January 2007 and March 2009, with the market value of financial institutions falling approximately 80 percent. The associated declines in wealth for these economies were enormous.

Part 4. Policy Responses to the Financial Crisis

The principle objective of this essay has been to explain how several crucial details of the U.S. mortgage and financial market interacted with some important macro pressures in the early years of this century to produce a dramatic increase in U.S. house prices. After house prices began to

fall in late 2006, the interaction of these same crucial micro elements helps to explain how the result was a credit crunch and eventually a full-blown global financial crisis.

Policymakers around the world recognized in the fall of 2008 that the financial crisis would have an effect on global output, employment and living standards. In short, the financial crisis would very likely lead to an economic recession, with output, income and employment falling, and unemployment rates rising. There were two principal reasons. First, credit is an important “input” for production by firms—they need credit to finance payrolls, purchases of machinery and equipment, and the construction or expansion of plants and factories. Since the financial crisis was exacerbating the ongoing interruption in credit markets, firms’ lack of access to credit (or the requirement to pay higher interest rates) would lead to declines in production and employment. Second, credit is also important for households who are considering purchasing new homes, cars, appliances, and other big-ticket items typically purchased on credit. The tightening of credit markets would therefore lead to a decline in desired consumption and investment and thus a decline in aggregate demand, providing firms with an additional reason to reduce their production and employment.

Faced with the emerging financial crisis and the likely economic recession to follow, policymakers in many countries implemented four broad types of policies. The policy details were different across countries, because the extent of the various problems differed, but the global nature of the financial crisis ensured that the broad outlines of the policy responses were similar.

Monetary Policies

The first policy response during the early stages of the credit crunch, which continued as the events evolved into a full financial crisis, was an aggressive provision of liquidity by central banks into the financial markets. Ordinarily, with properly functioning credit markets, central banks implement their monetary policy by changing their target for a very short-term interest rate, typically a rate applying to overnight lending between financial institutions. By changing very short-term interest rates, central-bank actions usually influence longer-term rates and thereby the demand for interest-sensitive expenditures. Through this mechanism, which we discuss in detail in Chapters 28 and 29, central banks can influence aggregate demand, output, and eventually the rate of inflation.

Though the central banks did reduce their policy interest rates quite substantially throughout 2008, they also recognized that such rate reductions were unlikely to be sufficient to restore credit markets to their normal state. With widespread fears of counterparty risk, the problem was larger than just a rise in interest rates caused by a decline in the supply of credit; the problem was a virtual halt in the flow of credit as even once-stable financial institutions could no longer receive overnight loans. The central banks recognized the need for direct injections of liquidity into the financial institutions. They therefore extended the terms of direct central-bank loans to financial institutions and broadened the list of assets they would accept as collateral on such loans. The effect was to provide financial institutions with the liquidity that they needed in order to continue playing their important role in the overall provision of credit to firms and households.

The central banks in the United States and the United Kingdom pursued even more creative monetary policies by engaging in what is now called *quantitative easing*. The scale of the financial crisis was largest in these two countries, and thus they experienced a greater need for expansionary monetary policy. Yet by early in 2009, their policy interest rates had approached a practical minimum and could not be reduced further. As a result, the U.S. Federal Reserve and the Bank of England were forced to conduct their monetary policy with different means. Rather than lowering their policy interest rate (which was then not possible), they used newly created money to directly purchase government securities in the financial markets, thus helping to reduce longer-term interest rates. There was considerable debate among economists and policymakers regarding just how such purchases would be conducted and whether the central banks would be able to successfully “exit” from these policies once their economies began to recover.

Support for Financial Markets

It was quickly recognized that the magnitude of the financial crisis required policy responses over and above what central banks could deliver. Governments would need to play an important role, using the collective resources of taxpayers to support financial institutions and help restore the flow of credit. This was nowhere truer than in the United States, where the troubled financial institutions and the associated “toxic assets” were most heavily concentrated. But governments in the United Kingdom, Europe, Asia, Canada, and elsewhere played similar roles.

There were three general approaches to governments' assistance to financial markets. First, it was quickly recognized after the collapse of Lehman Brothers that large and interconnected financial institutions could no longer be allowed to fail—the threat to the stability of the entire financial system was simply too great. Instead, governments would need to use taxpayers' resources to assist in their takeover by other private institutions or to nationalize them by the government taking an ownership share. Governments in the United States, the United Kingdom and Europe all took such actions. In contrast, Canadian financial institutions were far less exposed to the risky mortgage-backed securities and were also considerably less leveraged than their foreign rivals. As a result, no Canadian financial institutions were in danger of insolvency and thus it was unnecessary for the Canadian government to provide such direct support.

The second approach was to use taxpayers' resources to help clear the “toxic assets” from the balance sheets of those financial institutions that owned them. There was considerable debate about the best approach for doing this, and at the time of writing (November 2009) this is still unresolved. Some argued that taxpayers' money could best be used by purchasing the toxic assets from the troubled institutions and placing all of these assets in a “bad bank”. This would remove the problem of counterparty risk and restore the flow of credit. Then, as housing and financial markets recovered over time, the genuine value of the various assets would become clearer, and many of them would recover their pre-crisis values. Others argued that a simpler approach was to use taxpayers' money to partly nationalize the banks, making the government a part owner of the institutions. These capital injections would provide banks with the necessary liquidity and, over time, the true values of the toxic assets would be revealed. This was a large debate, especially in the United States and the United Kingdom where the largest number of troubled financial institutions were located: in Canada, this issue was much less important.

The third approach involved policies designed to increase liquidity in financial markets, and thus to help restore the flow of credit. Some of these policies were aimed at the formal banking system while others were aimed at the “shadow” banking system. Perhaps the most significant policy initiative in many countries, including Canada, was the government's use of taxpayers' funds to purchase large volumes of the safest mortgage-backed securities from the commercial banks, thus providing the banks with much-needed liquidity. This liquidity could then be used to increase the banks' supply of credit to financial markets, thus helping to reduce interest rates and restore the flow of credit. Government policies were also implemented that

used taxpayers' funds to purchase securities backed by non-mortgage assets, such as car-loan contracts. By offering to purchase such assets in large volumes, the presence of these policies increased the liquidity of these assets and thereby helped to restore these markets that had seized up during the financial crisis. With the markets for these assets restored, credit for individual car loans and for corporate loans for automobile fleets would flow again, thus helping to support this important segment of aggregate demand.

Fiscal Policies

Political leaders also recognized the need for fiscal policy to play a leading role in an effort to dampen the effects of the coming recession. The importance of *countercyclical* fiscal policy, which had for many years been questioned by economists who believed that monetary policy could be a more effective tool for stabilizing the economy, was underlined by the fact that by the late fall of 2008 central-bank policy interest rates were so low that it was unclear if most central banks could implement additional expansionary policies. With monetary policy “out of ammunition”, most political leaders argued that temporary and significant fiscal expansions had become necessary.

In November of 2008, the leaders of the G-20 group of countries met for the first time, in Washington D.C., and showed a remarkable degree of agreement regarding the necessary responses to the financial crisis and coming recession. They confirmed the need for expansionary monetary policy, but also agreed that there was little room for additional actions on this front. They also agreed that large and highly interconnected financial institutions could not be allowed to fail if their failure would threaten the stability of the financial system; in addition, they agreed that governments must act where necessary to help support financial markets and restore the flow of credit.

As for fiscal policy, the G-20 leaders agreed that significant fiscal expansions—and thus budget deficits—would be necessary. Increases in spending and reductions in taxes would need to be implemented as soon as possible and would need to last for two years. On the one hand, the leaders believed that short-run fiscal stimulus to their economies was necessary to dampen the effects of the coming recession; on the other, they agreed that the stimulus would need to be temporary so as not to lead to excessive accumulation of government debt. The leaders agreed

with the need for each country to provide fiscal stimulus in the order of 1-2 percent of their respective national GDPs.

All governments of the G-20 nations subsequently implemented significant and temporary fiscal expansions. Much of the new spending was committed to infrastructure projects such as roads, highways, bridges, and sewer systems, items that could be built relatively quickly and would have positive long-run effects on the country's productive capacity. Most countries also implemented some policies designed to protect the most economically vulnerable of their citizens, including tax reductions for low-income individuals and extensions to unemployment-insurance programs.

Financial-Market Regulations

The G-20 leaders also agreed at the Washington summit on the need to substantially improve financial-market regulations in their respective countries. In their view, regulations needed to be modified so that similar crises would not occur in the future. Moreover, many types of regulations would need to be closely examined, including those:

- regarding the appropriate level of capital reserves for commercial banks;
- limiting the extent of leverage for non-bank financial institutions;
- restricting the sales of specific types of residential mortgages;
- applying to potential conflicts of interest for credit-rating agencies;
- placing limits on executive pay and bonuses in financial institutions.

In the months following the G-20 leaders' summit, the countries worked together to develop a set of principles to guide the design of better financial-market regulations. By the fall of 2009, most of these principles had been established and the individual countries were occupied by the detailed tasks of designing new policies, appropriate for their own national circumstances but also consistent with the agreed-upon general principles.

Final Remarks

The 2007-2008 financial crisis and the global recession that followed were probably the most dramatic economic events to occur since the Great Depression of the 1930s. And there was no single or simple cause; instead, a large number of economic and institutional and regulatory arrangements combined with some powerful macroeconomic forces to create an environment in which relatively high-risk assets were willingly produced, marketed and sold by a whole collection of economic agents, from individuals purchasing homes to financial institutions creating the mortgage-backed securities to the institutional investors purchasing these assets with borrowed money. When U.S. house prices eventually began to fall, this entire financial edifice of risky assets and borrowed money came crashing down. In retrospect, it is possible to trace the storyline through time and understand how these various elements interacted to create the financial crisis. At the time, however, the large number of elements, and the complexity of how they interacted, ensured that few if any observers knew the extent of what was occurring, or the dangers involved.

Many economists argue that the most important lessons to be learned from the 2007-2008 financial crisis involve the need to improve financial-market regulations. But there is an important trade-off that needs to be recognized. On the one hand, regulations must be improved so that the stability of the entire financial system is not threatened in the event that an individual financial institution goes bankrupt. On the other hand, regulations should not be so onerous that financial innovation is thwarted and the profitability of institutions unduly limited. We must recognize that financial institutions play a crucial role in the global market economy and that the owners of these institutions must be able to earn appropriate (risk-adjusted) profits if they are to remain in business. Designing better financial-market regulations that achieve this balance will be a crucial task for economists and policymakers in the months and years ahead.
