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THE AMERICAN MORTGAGE IN HISTORICAL AND INTERNATIONAL CONTEXT

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The American Mortgage in Historical and International Context

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Home mortgages have loomed continually larger in the financial situation of American households. In 1949, mortgage debt was equal to 20 percent of total household income; by 1979, it had risen to 46 percent of income; by 2001, 73 percent of income (Bernstein, Boushey and Mishel, 2003). Similarly, mortgage debt was 15 percent of household assets in 1949, but rose to 28 percent of household assets by 1979 and 41 percent of household assets by 2001. This enormous growth of American home mortgages, as shown in Figure 1 (as a percentage of GDP), has been accompanied by a transformation in their form such that American mortgages are now distinctively different from mortgages in the rest of the world. In addition, the growth in mortgage debt outstanding in the United States has closely tracked the mortgage market's increased reliance on securitization (Cho, 2004).

The structure of the modern American mortgage has evolved over time. We begin by describing this historical evolution. The U.S. mortgage before the 1930s would be nearly unrecognizable today: it featured variable interest rates, high down payments and short maturities. Before the Great Depression, homeowners typically renegotiated their loans every year.

We next compare the form of U.S. home mortgages today with those in other countries. The U.S. mortgage provides many more options to borrowers than are commonly provided elsewhere: American homebuyers can choose whether to pay a fixed or floating rate of interest; they can lock in their interest rate in between the time they apply for the mortgage and the time they purchase their house; they can

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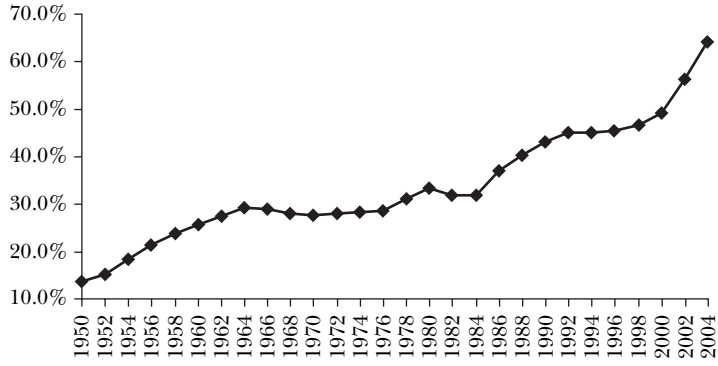
Figure 1
Mortgage Debt as Percentage of GDP



Source: GDP data are from ⟨http://www.bea.gov/bea/dn/gdplev.xls⟩. Mortgage debt data are from ⟨http://www.federalreserve.gov/releases/⟩.

choose the time at which the mortgage rate resets; they can choose the term and the amortization period; they can prepay freely; and they can generally borrow against home equity freely. They can also obtain home mortgages at attractive terms with very low down payments. We discuss the nature of the U.S. government intervention in home mortgage markets that has led to the specific choices available to American homebuyers. We believe that the unique characteristics of the U.S. mortgage provide substantial benefits for American homeowners and the overall stability of the economy.

Historical Context

Before the Great Depression, the single-family home mortgage was a very different instrument. Until the 1930s, residential mortgages in the United States were available only for a short term (typically 5–10 years) and featured "bullet" payments of principal at term. Unless borrowers could find means to refinance these loans when they came due, they would have to pay off the outstanding loan balance. In addition, most loans carried a variable rate of interest. Bartlett (1989) presents a fine historical overview of the origins of the modern U.S. mortgage.

Home mortgages typically had very low loan-to-value ratios of 50 percent or less and thus did not, by themselves, place substantial stress on lenders, because when borrowers were short of cash, their property could be sold if necessary to redeem their loan. But during the Great Depression in the early 1930s, property values in the United States declined by 50 percent relative to peak values. Holders of these mortgages, knowing their positions were insecure, refused to refinance loans that came due; as a result, borrowers defaulted, having neither the cash nor the home equity necessary to pay the loans back. A wave of foreclosures resulted—typically 250,000 per year between 1931 and 1935. At the worst of the Depression, nearly

10 percent of homes were in foreclosure. Financial institutions would in turn attempt to resell the properties that they repossessed, which placed even further downward pressure on the housing market.

In response to these calamities, the federal government began intervening in the housing finance market. It created three particularly important institutions: the Home Owner's Loan Corporation (HOLC), the Federal Housing Administration (FHA) and the Federal National Mortgage Association (FNMA). Table 1 provides a timeline of major government housing finance legislation.

The Home Owner's Loan Corporation (HOLC) raised funds using government-backed bonds, used the funds to purchase defaulted mortgages from financial institutions and then reinstated the mortgages. The HOLC changed the terms of the mortgages drastically, converting variable-rate, short-term, nonamortizing mortgages into fixed-rate, long-term (20-year) fully amortizing mortgages. (An "amortizing" mortgage is one where the principal is repaid over the life of the loan, so that the borrower does not face a large lump-sum payment at the end of the loan.) The HOLC ultimately purchased, reinstated and converted one million mortgages.

Because the federal government did not see itself as being in the business of holding mortgages in the long term, it needed to find a way to make these mortgages marketable. In particular, investors in the mortgages wanted assurance that they would receive the full principal balance and scheduled interest payments. While some private mortgage insurance companies were in business for this purpose before the 1930s, they were insufficiently capitalized and failed in the early 1930s. Consequently, the government established the Federal Housing Administration (FHA) to provide the mortgage insurance necessary for investors to purchase mortgages with confidence.[1]

Thus, the invention of the fixed-rate, self-amortizing, long-term mortgage was, above all else, a response to a general financial crisis, as opposed to a design for the promotion of homeownership per se. FHA adopted this form of mortgage to avoid the problem of people needing to refinance, which had clearly led to disaster. The combination of HOLC and the FHA represented a piece of early "financial engineering" that allowed illiquid financial institutions to become liquid again. The new long-term mortgage was of course no panacea for U.S. banking problems—one-third of U.S. banks failed during the Great Depression (Friedman and Schwartz, 1963)—but it helped.

The Home Owner's Loan Corporation, having performed its task, was disbanded in 1936. In its place, the Federal National Mortgage Association (FNMA,

[1] For FHA insurance, the borrower pays an upfront mortgage insurance premium (today 1.5 percent) and in addition, pays an annual insurance premium that declines over the life of the loan (today, this starts at around 0.5 percent of the loan balance) until the loan-to-value ratio falls below 75 percent. FHA has been consistently profitable, excluding the late 1980s. In a typical year, like 1992, it contributed $1.4 billion to the U.S. Treasury, as shown at p. 50 of ⟨http://www.whitehouse.gov/omb/budget/fy2006/pdf/cr_supp.pdf⟩. There has never been a taxpayer payout for FHA. Reserves were used for the high default period of the late 1980s, which was associated with the savings and loan crisis and overlending in certain states like Texas.

Table 1
Federal Legislation Timeline

1933	The Federal Deposit Insurance System and Home Owners Loan Corporation were established.
1936	The Federal Housing Administration was created.
1938	Fannie Mae was created to provide a secondary market by for FHA-insured loans.
1944	VA loan program was created as part of the Veterans Bill of Rights.
1948	Fannie Mae begins to purchase VA loans.
1968	HUD and Ginnie Mae were created, and Fannie Mae became a shareholder-owned government-sponsored enterprise.
1970	Freddie Mac was created (the Federal Home Loan Mortgage Corporation Act).
1981	Savings & loans were allowed to invest in ARMs, and deposit ceilings were removed.
1982	Savings & loans securitize and sell off below-market-rate mortgages.
1986	The Tax Reform Act of 1986 eliminated all interest-related personal deductions except for mortgages and home equity loans.
1989	Freddie Mac was restructured as a publicly traded corporation, and the Federal Institution Reform Recovery and Enforcement Act passed.

which would later be Fannie Mae) was invented as a government agency in 1938 for the purpose of abetting a secondary market in FHA mortgages. In particular, FNMA issued bonds for purchasing mortgages at par, so that investors in affluent communities could invest with confidence in mortgages in communities with little local capital. (Buying at par meant banks had no exposure to interest rate risk when lending long term and funding these loans by FNMA-issued bonds.)

The mortgage market changed little in the six years following the invention of FNMA. The Depression, the late 1930s and World War II were all times when the housing market had relatively little construction and few transactions. In 1925, new home construction in the United States peaked at 937,000 new units. This total fell to 93,000 units in 1933, and the 1925 peak was not surpassed (in fact was not even approached) until after World War II (U.S. Bureau of the Census, 1975).

With the anticipation of the end of World War II came the G.I. Bill of Rights, officially known as the Servicemen's Readjustment Act of 1944.[2] Included within the G.I. bill was the invention of the Veterans Administration mortgage insurance program—a program that allowed veterans returning home to obtain mortgages with very low down payments. The program was intended both to reward veterans and to stimulate housing market construction. At about this time, the Federal Housing Administration (FHA) also sought to stimulate housing construction by substantially liberalizing its terms. In 1948, the maximum term of a mortgage rose to 30 years (from an initial maximum of 20 years). In 1956, the FHA raised the maximum loan-to-value ratio to 95 percent (from an initial maximum of 80 percent) for new construction and to 90 percent for existing homes. However, the FHA did retain a cap on the size of the loan it would insure, and in doing so,

[2] G.I. stands for "government issue." The term originally applied to articles that were issued in accordance with military procedures or regulations. By the end of World War II, G.I. or G.I. Joe had become a nickname for American soldiers, too.

it allowed for a private sector market in mortgage insurance to develop for high-balance loans.[3]

With the strong expansion of the U.S. economy in the post–World War II period driving up incomes, together with the new institution of the long-term (and therefore affordable), fixed-rate, self-amortizing mortgage, homeownership expanded rapidly. America was transformed from a nation of urban renters to suburban homeowners: the ownership rate among U.S. households rose from 43.6 percent in 1940, the last census year before World War II, to 64 percent by 1980 (Census of Population and Housing, 1940 and 1980). The FHA mortgage was a key to this transformation. Its profitability to the U.S. Treasury (discussed in footnote 1) induced large-scale entry of the private sector, which developed the self-amortizing, privately insured mortgage. The "modern" private mortgage insurance business started with the Mortgage Guarantee Insurance Corporation in 1957 and allowed for lenders to make low down payment loans beyond FHA limits. Over time, the private sector market share for mortgage insurance grew as it outcompeted the publicly insured provision of mortgage finance: FHA mortgage insurance fell from 29.4 percent of the mortgage market in 1970 to less than 10 percent in the mid-1990s (Vandell, 1995). Together, the FHA- and the private sector–provided mortgage, which came to be called the "conventional mortgage," dominated the market.

This mortgage market settled into a pattern over the two decades following World War II. The major funders of mortgages during this period were commercial banks and savings and loans. These institutions had an inexpensive source of funds for mortgages: deposits backed by the Federal Deposit Insurance Corporation (in the case of banks) or the Federal Savings and Loan Insurance Corporation (in the case of savings and loans). Because typical relatively small depositories had the full faith and credit of the U.S. government guaranteeing their deposits, these financial institutions could offer low interest rates.[4] Fixed-rate mortgages typically paid between 5 and 6 percent in the market. Between 1945 and 1966, yields on three-month Treasury bills never rose above 4 percent. Depository institutions could thus raise capital from depositors, who could get a safe government-protected yield and a higher return than Treasury bills by putting their funds in a depository institution.

This arrangement began to show some cracks in 1966, when the three-month Treasury yield rose above 4 percent, and deposits flowed out of savings and loans and into Treasury bonds, resulting in a shortage of funds for mortgage borrowers. One of the responses to this event was the 1968 splitting of Fannie Mae into two pieces: the Government National Mortgage Association, known as Ginnie Mae, and

[3] FHA mortgages also did not have prepayment penalties, meaning that households were insulated from interest rate risk relative to adjustable-rate mortgages. Both adjustable-rate mortgages and fixed-rate mortgages without prepayment penalty allow borrowers to take advantage of declining interest rates, however, adjustable-rate mortgages expose the borrower to the risk of interest rate increases. For a history of the terms of the FHA program, see Cutts and Nothaft (2005).

[4] Deposits were insured up to $5,000 until 1950, $10,000 until 1966, $15,000 until 1969, $20,000 until 1974, $40,000 until 1980 and $100,000 thereafter.

the "new" Fannie Mae, which would now be privately held and would be able to buy and sell non–government-backed mortgages to raise additional funds for mortgages. In addition, by taking Fannie Mae private, the government was able to remove Fannie Mae's debt from its balance sheet. Congress created Freddie Mac in 1970 to securitize mortgages issued by savings and loans. A mortgage insurance function was kept inside the government through Ginnie Mae for two reasons: first, to continue to provide a full government-backed guarantee of timely payments of FHA-foreclosed mortgages to the lender; and second, to be able to package and securitize FHA loans.

Congress's intent with the creation of Ginnie, the new Fannie and Freddie was at least in part to assure that the mortgage liquidity problems of 1966 would not recur. The federal charters that were granted to Fannie and Freddie require them to promote liquidity and stability in the secondary market for mortgages as well as to provide mortgage credit throughout the nation. These institutions would in turn bring uniformity to the mortgage market and invent financial instruments—derivatives of mortgage-backed securities—that would help keep the mortgage market liquid from the mid-1980s until today.

The ignition of inflation in the later 1960s and 1970s altered the ability of depositories to fund long-term, fixed-rate mortgages: inflation pushed up nominal interest rates and eroded the balance sheets of depositories that funded fixed-rate mortgages. Depositories found themselves in a straitjacket due to Regulation Q, a federal rule that placed a ceiling on the rate that depositories could pay depositors. As nominal interest rates rose, depositories could not match what the market was paying, and they saw deposits flow out their doors to U.S. Treasury securities—assets back by the full faith and credit of the United States that paid a market rate of interest. A second factor in limiting the ability of depositories to fund fixed-rate mortgages was the rise of new competing savings vehicles, such as money market funds, mutual funds and pension funds, which paid higher rates than depositories and which had become accessible to small savers. Also, long-term savings vehicles, such as pension funds, were better suited to hold investments in long-term assets, such as securitized long-term mortgages.

The result of the ignition of inflation and the new savings vehicles was an outflow of funds from the banking sector. This outflow led to a crisis in the savings and loan industry, a major structural change in U.S. mortgage markets and, ultimately, a transformation of the housing finance system.[5] The commercial banking industry was not nearly as affected since, unlike savings and loans, which by statute invested in mortgages, banks were able to invest in a variety of assets. Legislation responded to the new environment and removed deposit ceilings and allowed savings and loans to invest in adjustable-rate mortgages.[6] But having been

[5] For a discussion of the savings and loan crisis and its aftermath, see Benston and Kaufman (1997).

[6] The legislation that allowed adjustable-rate mortgages and eliminated interest rate ceilings for savings and loans was the St. Germain Depository Institutions Act of 1982. Specifically, Title VIII—the "Alternative Mortgage Transaction Parity Act of 1982" Sec.803 (A)—"in which the interest rate or finance charge may be adjusted or renegotiated."

burned once, depository institutions were worried about lending at a fixed rate when there was a risk that nominal interest rates would rise. If a homebuyer chose an adjustable-rate mortgage, the depositor typically held on to it—since the borrower was absorbing the interest rate risk. If the homebuyer chose a fixed-rate mortgage, then the lender typically sold it to Fannie Mae, Freddie Mac or Ginnie Mae, which then packaged the loans into mortgage-backed securities and resold them to individual investors and institutions whose balance sheets were more compatible with holding a long-term asset with a fixed nominal rate. Instead of the traditional reliance on savings and loans and commercial banks as sources of funds for mortgage loans, funds began to come from securities backed by mortgages and then traded in a secondary mortgage market. Thus, securitization became a dominant source of funds for long-term residential mortgages.

For a time in the early 1980s, when adjustable-rate mortgages became available and when many pundits were projecting massive and variable inflation for years to come, it even appeared that the fixed-rate mortgage might become an historical anomaly, and that the U.S. mortgage market would return to the adjustable-rate mortgages that had been common before the 1930s. In a highly volatile inflationary context, fixed-rate mortgages become exorbitantly costly, largely eliminating their market, as shown in Figure 2. However, the Federal Reserve brought inflation under control, and the fixed-rate mortgage regained its vitality, so that it remains the most common form of residential mortgage financing in the country. In no year since 1995 has the share of fixed-rate mortgages fallen below 70 percent of the total market, and in some years, the fixed-rate share has been nearly 90 percent (Freddie Mac, 2005).[7]

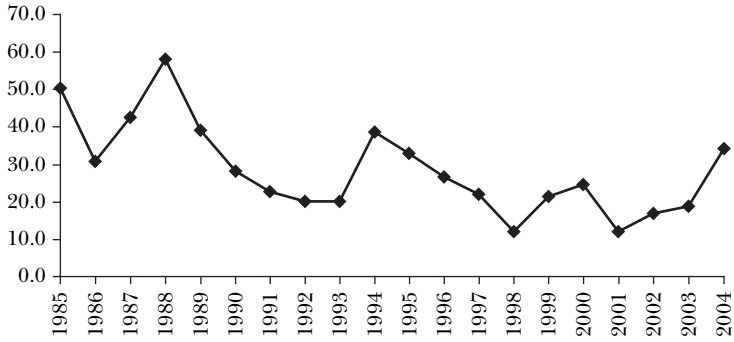
The shift to mortgages being funded by capital markets rather than by depositories has continued. By the end of 2003, Fannie and Freddie either guaranteed or held more than $3.6 trillion of mortgages, or about 60 percent of the market in which they are allowed to participate and 43 percent of the overall market.[8] Firms that purchase U.S. mortgages in the secondary market are managed by professionals who are certainly more capable of bearing, matching and managing these risks than are individual homeowners, thereby reducing the risk that U.S.-style mortgage lending imposes on homeowners and the overall economy.

In retrospect, the 1950s arrangement of deposit mortgage funding in the United States came apart on two dimensions. First, people stopped saving solely in bank accounts and instead, with the liberalization of capital markets, increasingly used mutual funds, pension funds and the like as savings vehicles. In fact, given the

[7] The adjustable-rate mortgage (ARM) share of applications generally fluctuates with the yield curve: as the yield curve steepens, the ARM share increases, as the cost of ARMs drops relative to fixed-rate mortgates. The recent increase in the share of ARMs to a 10-year high of 36 percent, coupled with a flat yield curve, is anomalous, which raises questions as to its origin. Many variants of traditional ARMs have also been recently developed such as hybrid instruments, interest only loans and option ARMs, which allow negative amortization. Affordability pressures in some markets may be at work.

[8] Fannie Mae and Freddie Mac are permitted to purchase only conforming mortgages—those mortgages whose balance falls below a regulatory maximum that changes each year with house prices. In 2005, the conforming loan limit is $359,650.

Figure 2
Adjustable Rate Mortgages as a Percentage of all Loans



Source: FHFB.

growth in the mortgage market, depositories today have insufficient funds to back the entire demand for mortgages. Second, borrowers want long-term fixed-rate mortgages. The fixed rates protect them against rising interest rates, and the ability to refinance protects them against falling interest rates. The savings and loan crisis made clear the dangers of funding short-term liabilities with long-term assets in markets with volatile interest rates. Depositories can only hold long-term fixed-rate mortgages when nominal interest rates are low and stable, as they were in the 1950s and 1960s. With securitization, long-term assets can be funded through accessing capital markets, which are increasingly global in scale.

International Context

The U.S. home mortgage is unique in comparison to its international counterparts in developed countries around the world.[9] We compare the U.S. mortgage market with those in the United Kingdom, France, Germany, Italy, Canada and Japan. We also add Denmark to this mix, as it has the mortgage market that is arguably most similar to the United States, as well as South Korea, because it is a puzzling example of a country with a sophisticated (although still developing) economy and an unsophisticated mortgage market.

Table 2 summarizes key mortgage terms in these countries and is based on the work of Lea (2003), Diamond (2004), Dübel (2004), Wyman (2003) and Renaud

[9] Any discussion of how mortgages in the United States compare with their international counterparts becomes quickly limited to a comparison with mortgages in developed countries. Countries that are not high-income countries have little in the way of liquid assets relative to GDP and as a result are unable to fund mortgages easily (Renaud, 2004a). While the ratio of mortgage debt outstanding to GDP was 58 percent in the United States in 2002, it was no more than 14 percent in any Latin American country, was no more than 11 percent in any Middle Eastern country (other than Israel) and was no more than 22 percent in any South or East Asian country (other than Japan, Hong Kong, Singapore and Taiwan).

Table 2
Mortgages Terms across Different Countries

	Typical LTV	*Maximum LTV*	*For 2nd mortgage*	*Mortgage debt to GDP*	*Fixed-term range 10–20 years*	*Fixed-term range 20+ years*	*Repayment by fee-free redemption*
U.S.	75%	97%	A	69%	A	A	A
Denmark	80%	80%	A	70%	A	A	A
France	67%	100%	L	25%	A	L	N
Germany	67%	80%	A	53%	A	L	N
Italy	55%	80%	A	13%	L	L	N
Netherlands	90%	115%	A	100%	A	L	N
Portugal	83%	90%	A	51%	N	N	N
Spain	70%	100%	A	42%	L	L	N
UK	69%	110%	A	69%	L	N	L
Japan	80%	80%		36%	A	A	L
Korea	40%	75%	N	14%	L	N	A
Canada	65%	90%	A	44%	N	N	N
Australia	63%	80%	A	74%	N	N	L

Notes: Key A = available; L = limited availability; N = no availability.
Source: From Mercer Oliver Wyman and European Mortgage Federation (2003), with supplemental data on the United States, Japan, Korea, Canada and Australia from Cho (2002), the International Union for Housing finance (⟨www.housingfinance.org⟩, 2005) and authors' calculations.

(2004a). The first column shows the average ratio of the home loan to the value of the home at the time of purchase; the second column shows the highest loan-to-value ratio commonly available. The loan-to-value of the U.S. mortgage is actually higher than in many countries, and the maximum value is high, but by no means the highest. A number of countries allow borrowing the full value of the home, and in the United Kingdom and the Netherlands, a homebuyer can borrow more than the value of the home. (Mortgages with a 110 percent loan-to-value ratio are possible, although risky, if they are underwritten as though they are consumer loans with the home as additional collateral.) The third column states whether or not citizens may take out a second mortgage. The fourth column reports information about the total level of these countries' ratio of mortgage debt outstanding to GDP. The fifth and sixth columns show that the United States, Denmark and Japan are the only countries in which fixed-rate mortgages are available at all maturities. In a few other countries, fixed-rate mortgages are available at shorter terms of 10–20 years only. With the exception of Turkey, consumer price index growth was less than 5 percent in all OECD countries in 2004, yet fixed-rate mortgages are still rare in most countries, and around the world adjustable-rate mortgages prevail. The final column shows how easy it is to pay off the mortgage in advance. The U.S. mortgage market is one of only three in which fee-free prepayment is widely available, and in only a few other countries, prepayment is of limited availability. Refinancing a mortgage is clearly much easier in the United States.

To clarify patterns of mortgage markets, we group countries into three categories: 1) economies with low levels of securitization, which are the United

Kingdom, Canada and Japan; 2) economies with substantial levels of securitization, which include Germany and Denmark; and 3) economies with (relative to the others) less developed financial markets and low mortgage debt obligations, including France, Italy and South Korea.

Countries with Low Levels of Securitization: United Kingdom, Canada and Japan

In the United Kingdom, variable-rate mortgages dominate. Thus, British homeowners bear significant interest rate risk, a risk that they are not particularly well-suited to bear and cannot easily hedge. One of the reasons for reliance on variable-rate mortgages is that the United Kingdom relies on depository institutions, rather than capital markets, to fund mortgages—and depositories prefer to have borrowers absorb the interest rate risk. But Miles (2003) also suggests that borrowing habits in the UK are path-dependent—that because fixed-rate mortgages have never been widely used in the UK, borrowers do not understand the benefit of paying a higher coupon rate in exchange for a reduction in balance sheet risk.

Canadian borrowers also, unlike their U.S. counterparts, lack access to mortgages with fixed rates, penalty-free prepayment and high loan-to-value ratios. Canadian mortgages rarely have rates that are fixed for more than five years—and seven seems to be the outside limit.[10] They almost always have "yield maintenance" penalties—that is, penalties that guarantee lenders a minimum rate of return over a minimum period of time—for the period of time at which the interest rate *is* fixed. Finally, Canadian mortgages without mortgage insurance can take on a maximum loan-to-value ratio of 75 percent; where as the U.S. rule is 80 percent.

Canada does have an FHA-like mortgage insurance fund, called the National Housing Act (NHA) fund. NHA loans have the full faith and credit of the Canadian government behind them, and the investors in these loans are guaranteed the timely payment of principal and interest. Loans insured by this fund can generally have loan-to-value ratios of up to 90 percent and sometimes more. Mortgages backed through the NHA are also securitized and resold to the capital markets: in fact, the mortgage-backed securities issues by NHA are therefore quite similar to those issues by Ginnie Mae in the United States. But beyond those mortgages explicitly backed by the Canadian government, mortgages in Canada are not securitized, but are rather largely held by depositories. In 2004, more than 75 percent of mortgage debt outstanding in Canada was held in portfolios of bank and credit unions (which helps to explain why interest rates are fixed only for short periods), and mortgage-backed securities represented only 12.7 percent of the total residential credit outstanding in Canada. Apparently, if the Canadian government does *not* back mortgages, Canadian capital markets have little appetite for other mortgage-backed securities.

The Japanese mortgage market has grown rapidly in the past 30 years; the ratio of mortgage debt outstanding in that country has risen from 21 percent in 1980 to 36 percent in 2003. In fact, Japan's mortgage market has evolved in a way that

[10] We consulted the websites of the largest Canadian banks to form this conclusion.

resembles the evolution of the U.S. mortgage market, although with a lag. An excellent overview of mortgage finance in Japan comes from Credit Suisse First Boston (2004).

In 1950, Japan set up a government corporation, the Government Housing Loan Corporation (GHLC), to provide stable housing finance and to stimulate the construction of housing after World War II. GHLC provided long-term fixed-rate mortgages with spreads of roughly 100 to 150 basis points over Japanese ten-year Treasury notes. Currently, GHLC mortgages make up about one-third of the mortgage market in Japan; the rest comes largely from private sector banks. GHLC borrowers faced some limits; for instance, they can pay no more than 25 percent of their income in mortgage payments.

Securitization of residential mortgages has come to Japan relatively recently, under conditions somewhat reminiscent of the U.S. housing market in the 1930s. With the collapse of Japanese real estate values in the early 1990s, specialized housing lending institutions in Japan became insolvent, as mortgage defaults rates increased. As part of the structural reform of Japanese financial institutions, the Japanese government enacted a 1998 law that allowed for asset-backed securitization; in 2001, the government charged GHLC with the responsibility for developing residential mortgaged-backed securities. GHLC mortgages by law may not carry a prepayment penalty, unlike the long-term mortgages offered by banks. However, banks offer mostly adjustable-rate or short-term (typically three-year) fixed-rate mortgages.

In 2003, around $8 billion in new Japanese mortgages were securitized through GHLC. This is a start, but only a small part of the country's mortgage market. There are also proposals to replace GHLC with another institution in the near future to encourage securitization and fixed-rate long-term mortgages, but no plans for this new institution have yet been set forth.

Countries with Securitization: Germany and Denmark

German mortgages appear to provide only limited options to borrowers. The loan-to-value ratios on first position mortgages are low (60 percent or less), and such mortgages generally have "yield maintenance" clauses—requirements that when borrowers prepay, they pay the lender all the interest they would have paid had they amortized the mortgage to maturity. If borrowers wish to borrow more than 60 percent, they may take out second mortgages up to an additional 20 percent of value. The result is that lenders in mortgage bonds in Germany take on little credit risk, and much more risk is born by borrowers. In addition, German borrowers may not easily extract equity from their homes through the mortgage market.

Nonetheless, Germany has a deep mortgage market, with a ratio of mortgage debt outstanding to GDP ratio of 54 percent. Germany's mortgage system relies on capital markets to fund mortgages through bonds called *Pfandbriefe* and not just depositories. The interest rates charged on first mortgages are only slightly above rates on government bonds of similar maturity. Germany also has a government-

backed institution for funding mortgages aimed at lower-income and first-time homebuyers.

Denmark is the only country to have a widely available mortgage that contains most of the key features of the U.S. mortgage. Denmark's mortgage market also relies heavily on capital markets for financing its mortgages. Danish mortgages are freely pre-payable in the U.S. sense without a penalty per se—although Danish borrowers must redeem the bonds underlying their mortgages at market value, rather than at par.[11] In addition, Danish borrowers have an option not generally available to U.S. borrowers: when Danes sell their homes, they can essentially pass on their mortgage to the next homeowner. As such, a mortgage whose coupon rate is below the market rate at the time of sale need not be paid off.

However, prospective Danish homebuyers face two limitations more severe than their U.S. counterparts. First, required down payments in Denmark are far higher than in the United States. In the United States, for example, mortgages with a loan-to-value ratio of 80 percent get the best terms available in the market, and mortgages with even higher loan-to-value ratios are readily available if the borrower purchases mortgage insurance. In Denmark, to get to a mortgage with an 80 percent loan-to-value ratio, borrowers must take out a variable-rate second mortgage. Second, borrowers in Denmark must fit a strict and uniform set of underwriting criteria to qualify for a mortgage. This provision makes the Danish mortgage homogenous with respect to credit risk and therefore easy to securitize. But it also means that some borrowers who would be able to qualify for a mortgage in the United States, where standards for qualifying are more flexible, would get shut out of the Danish market.

Countries with Low Mortgage Debt Outstanding: France, Italy and South Korea

For an economy of its size and sophistication, France has a remarkably small mortgage market. Its ratio of mortgage debt outstanding to GDP is only 25 percent, less than half the ratios found in the United States and Germany. Yet by world standards, French mortgage terms are consumer friendly. Over half the mortgages in France have fixed rates to term (although this term is generally less than 20 years), and prepayment penalties are limited by statute. But the regulatory environment for mortgages in France is complicated, which seems to have led to a business where risk-adjusted profits are lower than they are in other countries and the number of suppliers of mortgages in France is limited. In addition, mortgage interest is not subsidized in France, while the rental market is heavily regulated and subsidized.

The mortgage market in Italy is very small, with a ratio of mortgage debt outstanding to GDP ratio of 13 percent. The type of mortgages available helps to

[11] For an excellent description of Danish mortgages, see Frankel, Gyntelberg, Kjeldsen and Persson (2004). One caveat worth noting: Danish mortgages are not prepayable if they were financed with noncallable bonds—but most mortgages are backed with callable bonds. These transaction costs, as well as affordability pressures, may explain the development and growth of a new instrument in Denmark; the Bolix-X. The Bolix-X is an adjustable-rate mortgage with a cap (Jensen, 2005).

explain why: they carry variable-rates of interest, are short term, have low loan-to-value ratios and have prepayment penalties. Moreover, the banking and property registration systems are far less developed in Italy relative to the rest of Europe. Italy continues to regulate interest rates paid on deposits as well as bank staffing levels and has among the longest processing times for mortgages in Europe. Moreover, Italy lacks a central, electronic property registration database, which means that the process of valuing collateral takes longer than in other countries (European Mortgage Federation, 2003).

However, Italy's mortgage market is developing. Italy has begun to turn to capital markets for funding mortgages. While the volume of Italian mortgage securities remains small (around $10 billion were issued in 2003), it has been growing at a double-digit pace (ESF, 2004). Italy's ratio of mortgage debt to GDP, while still small, is four times larger than it was only 15 years ago. In addition, Italy's unfortunate experiences with high inflation since World War II have made long-term lending less attractive. But since Italy now uses the euro for its currency, the legacy of high inflation may no longer cast a shadow of high inflation risks for the future.

We finish our world tour of mortgage markets with a brief stop in South Korea, which offers an interesting case of a country whose economy has developed impressively over the past 50 years, but whose mortgage system has not. This is in contrast with other affluent Asian countries such as Singapore and Taiwan. For example, the ratio of mortgage debt outstanding to GDP in Korea is 14 percent—similar to the level in Italy. The corresponding level in Singapore is 59 percent.

Loan-to-value ratios in Korea, although rising, remain very low at 40 percent or less (Cho, 2002). In response, the Korean government in 1999 developed a corporation called KoMoCo, which became Korea Housing Finance Corporation (KHFC) as of 2004, whose purpose is to securitize mortgages. KHFC acts as a conduit between mortgages and capital markets, much as Fannie, Freddie and Ginnie do in the United States, and much as *Pfundbriefe* do in Germany and mortgage-backed bonds do in Denmark. However, Korean housing and mortgage markets face two fundamental issues not found in other countries.

First, the Korean land market was heavily regulated through the period leading up to the Asian financial crisis in 1997–1998 (Renaud, 2004b). Property values become artificially high as the demand for land in the rapidly growing country vastly outstripped the supply made available by the government. As land use became liberalized and the economy slowed in the late 1990s, property values fell. This recent volatility in the property market in Korea will make higher loan-to-value mortgages less attractive to investors.

Second, distribution channels for mortgages in Korea are highly concentrated and limited. In 1999, a single lender originated 75 percent of mortgages in Korea (Cho, 2002); this contrasts with a 9 percent market share for the top lender in the United States. The lack of competition in the origination market offers less incentive to provide Korean borrowers with a variety of mortgage products. Today, the vast majority of mortgages offered in Korea are short-term (three-year) adjustable-rate bullet loans, which make households and the economy highly vulnerable to

mortgage payment shock if interest rates rise and explains the effort on the part of the government to encourage long-term mortgages.

Our tour of world markets illustrates differing outcomes in mortgage systems across countries: for those countries where depository institutions prevail, including the UK and Canada, mortgages tend to be held in depository portfolios, there is a lack of securitization, and borrowers tend to be limited to adjustable-rate mortgages or short-term instruments. For countries with substantial mortgage securitization, such as Denmark and Germany, concern over bank solvency has led to regulations that limit borrowers' option to prepay and to refinance at lower rates when rates drop (because this would increase financial institutions' earnings volatility). Countries with low mortgage debt outstanding, such as France, Italy and South Korea, tend to have less developed financial markets in general and, as a result, lack securitization and mortgage choice, limiting borrowers' interest rate and prepayment options.

The Future of the American Mortgage

The United States seems to have found a formula for offering favorable conditions and choices to mortgage borrowers, maintaining liquidity in mortgage markets and managing the risks of lending at fixed interest rates. The Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation—that is, Fannie Mae and Freddie Mac—play a central role in the U.S. mortgage market by raising funds to issue securitized mortgages and by playing an active role in the secondary market for mortgage-backed securities. This institutional framework for the U.S. mortgage market raises several questions. First, just how do Fannie and Freddie distribute the risk from mortgages with fixed interest rates and easy prepayment options across the economy? Second, even if Fannie and Freddie were useful in developing the U.S. market for securitized mortgages, could their functions now be replaced by fully private agents? Third, a number of analysts have pointed out that Fannie Mae and Freddie Mac have an anomalous status of being nominally private firms that nonetheless are perceived by capital market to have ties with the federal government that allow them access to funds more cheaply than any potential competitors (in this journal, for example, Frame and White, 2005). Does the existence of such government-sponsored enterprises, as they are sometimes called, create potential risks that may offset any benefits they provide? To understand the future of the American mortgage, we examine these questions in turn.

How Do American Financial Institutions Distribute the Risk from Fixed-Interest Rate, Prepayable Mortgages across the Economy?

Both the agency and private label mortgage-backed securities use structured transactions to manage the risk from fixed-interest rate, prepayable mortgages. These structured transactions allow for the distribution of this risk through the economy. Fixed-rate, prepayable mortgages present two major risks: interest rates

may change; and since borrowers can prepay, the duration of the mortgages is uncertain.

To understand how these risks can interact, consider a life insurance company that invests in mortgages and/or mortgage-backed securities. Let us say that the present value of the cash-flow owed to their policyholders is paid out, on average, in year ten. The insurance company then buys mortgages or mortgage-backed securities with an expected duration of ten years. If interest rates rise, then the insurance company finds that the value of its mortgage securities has declined, and it may have insufficient reserves to pay off its claims, unless the duration is matched precisely with the obligation. Now suppose interest rates fall. Borrowers have an incentive to prepay, and the duration of the insurance company's assets shortens. Cash that comes in must be reinvested at a lower rate—meanwhile, the present value of the company's liabilities increase with the falling discount rate. The insurance company is foiled in its attempt to match its long-term obligations with a long-term asset, as the duration of mortgages decreases in a falling interest rate environment.

To hedge against interest rate changes and to reduce the volatility of duration, mortgage-backed securities in the United States are sliced using one of four broad derivative types: 1) sequential tranches; 2) planned amortization class (PAC) and companion bonds; 3) interest only (IO) and principal only (PO) strips; and 4) floaters and inverse floaters. Let us briefly describe these derivatives and their purposes.

In a *sequential tranch*, the cash flows from the mortgage-backed securities are divided into rating classes.[12] A common pattern is for senior tranches to receive principal—both scheduled and unscheduled (that is, what occurs from prepayments)—before junior tranches. Until senior tranches get paid off, junior tranches receive only interest payments. The timing of payment to the more senior tranches occurs with a great deal of certainty, while the market for junior tranches is then left to speculators, who expect a higher return in exchange for the risk they assume.

In the *planned amortization class (PAC) structure*, which can be viewed as a form of tranch, investors in PACs are guaranteed the timing of their cash flows—so long as the underlying mortgage prepayments fall within a range of specified prepayment schedules. This security is very popular and accounts for more than 50 percent of residential mortgage-backed security derivatives (Fabozzi, 2001). However, the "companions" to these PACs that come into play when the underlying mortgage prepayments fall outside the specified schedules are very risky.

In "stripped" securities, the payments from a security are divided into separate instruments. *Principal-only (PO) strips* are securities that pay investors only principal payments—scheduled and unscheduled—at the time the borrower makes these payments. As interest rates fall, principal payments arrive faster, and at a lower discount rate, meaning that the security becomes much more valuable; the converse happens when rates rise. PO strips thus make a good hedge to portfolios that

[12] For detailed descriptions of Sequential Tranching and Planned Amortization Class Securities, see Fabozzi (2001, chapters 9 and 10, respectively).

would suffer from falling interest rates. *Interest only (IO) strips*, on the other hand, can rise in value as interest rates rise. Although the discount rate rises with interest rates, the sum total of interest payments rises, too, as prepayments slow. IO strips are thus useful hedges for portfolios that would suffer from rising interest rates.

Finally, *floaters* have a small duration, while *inverse* floaters have an extreme duration. These derivatives break a fixed-rate underlying security into two pieces: the return of the floater is usually contracted to be some specified spread over the benchmark London Interbank interest rate (LIBOR). Therefore, the return on the floater rises or falls with prevailing interest rates, and it tends to keep roughly the same value regardless of the interest rate environment. The return on the inverse floater moves inversely with interest rates—that is, it generally falls as the benchmark LIBOR interest rate rises—and therefore its value is exceptionally sensitive to changes in interest rates. The inverse floater is an important hedge instrument for institutions that would suffer from falling interest rates, but it is a highly speculative financial instrument. The financial difficulties of Orange County, California, in the early 1990s were in large part a function of an over-reliance on inverse floaters as an investment (Erisk, 2001).

These financial instruments are crucial to the ability of the United States to finance its unusual mortgage structure, because they allow investors to manage the complicated interest rate risk embedded in the U.S. mortgage. No other country, so far as we can tell, has anything like the panoply of financial products in the United States. Japan does have a mortgage derivative structure that resembles the United States, where the GHLC securitizes and then slices and dices mortgages, but the Japanese market for mortgage-backed securities is less than 1 percent of the size of the U.S. market. The derivative markets increase investment demand for mortgage-backed securities, thus supporting liquidity and delivering low-cost funding, even in times of financial distress, for the mortgage market.

Could Fannie Mae and Freddie Mac be Replaced by Fully Private Agents?

Some argue that even if Fannie Mae and Freddie Mac have indeed created substantial benefits to homebuyers and to the U.S. economy through their development of the secondary market for mortgage-backed securities, they have outlived their usefulness. As a parallel example in the housing market, private mortgage insurance learned from mimicking successful government mortgage insurance until the government program became redundant (White, 2002; Wallison, Stanton and Eli, 2004). Now that many agents in the U.S. financial markets have experience with mortgage-backed securities and derivatives, could Fannie Mae and Freddie Mac step aside with little loss?

One argument in support of Fannie Mae and Freddie Mac is that because they can borrow at preferential rates, due to their implicit federal government guarantee, they can pass on lower interest rates for home mortgages. But, of course, this argument cuts in several directions. Funneling lower-than-market rate financial capital raises the risk that society will invest an inefficiently high amount in housing, and also that the risks of that investment are being underpriced by the market. No one wants to find out if the federal government would really pay off tens of billions

of dollars if Fannie Mae and Freddie Mac became bankrupt. But setting aside the argument about lower interest rates for a moment, Fannie Mae and Freddie Mac mortgage-backed securities have three other major differences with the private label market: 1) the ability to make forward commitments; 2) the structure of the securities; and 3) interest rate spreads relative to U.S. Treasury bonds at times of general financial market stress.

A substantial portion of Fannie Mae and Freddie Mac securities are sold into the so-called "To Be Announced," or TBA, market (Beller, 2004). These transactions involve forward sales of mortgage-backed securities comprised of pools of mortgages not yet identified and in many cases not yet in existence. Market participants in the TBA market set the standards that the securities and the mortgages in the pools must meet based on mortgage pools already available to the market. This mechanism allows Fannie and Freddie to "lock in" mortgage rates for borrowers in advance of having actual mortgage available for purchase. This provision is popular among borrowers, particularly for fixed-rate mortgages, but it is only possible because Fannie Mae and Freddie Mac do not face the same disclosure requirements for their debt securities as fully private firms.

The structure of mortgage-backed securities from Fannie Mae and Freddie Mac are quite different from private-label securities because Fannie and Freddie put their corporate guarantees behind every dollar of mortgage-backed securities that they issue. By contrast, in the private label market, the securities are divided into different credit rating classes, or credit tranches. The implicit government guarantee that allows Fannie Mae and Freddie Mac to raise funds more cheaply also gives them the ability to attract the best credit and collateral risk mortgages to their mortgage pools; they can use these good risks to offset higher credit and collateral risks from other mortgages. In return for the funding advantage, Fannie Mae and Freddie Mac must provide funding in all places at all times. For example, Ambrose and Buttimer (2005) show that rural housing markets, which are less informationally rich than more thickly traded urban markets, are tied into capital markets through Fannie Mae and Freddie Mac. The private label market, on the other hand, relies on structured transactions that separate risks instead of pooling them, which induces the private market to give favorable treatment to lower risk places. The ability of Fannie Mae and Freddie Mac to avoid credit tranching avoids the payment of fees to investment banks and rating agencies (Frame and White, 2005). It also results in more homogenous and therefore more liquid securities. Indeed, in our view, one key to the array of choices being offered to mortgage borrowers is that, because of the funding advantage of Fannie Mae and Freddie Mac, low-risk borrowers are offered an appealing contract so they will participate in the same mortgage pool as higher-risk borrowers.[13] Otherwise, higher- and medium-risk borrowers might face a very different menu of mortgage options than lower-risk borrowers. The private label market would likely charge more to borrowers of

[13] The way in which Fannie Mae and Freddie Mac use their funding advantage to create broader pools can be viewed as a clever, if accidental, method for solving the Stiglitz and Weiss (1981) pooling problem in the mortgage context.

different risk categories. The pooling of risk through Fannie Mae and Freddie Mac extends the market to marginally credit worthy borrowers and crowds out risk-based lending to this market segment.

For interest rate risk, both the private label market and the agencies have the option to tranch, which they sometimes, but not always, exercise. With respect to credit risk, however, the private label market nearly always tranches, and Fannie and Freddie nearly always pool. The Fannie and Freddie pools are treated as homogeneous securities by investors. This pattern leads to deep markets and economies of scale that reduce costs to all borrowers, including those who are the best credit risks.

While the private label market can offer fixed-rate mortgages in the United States, they do so both at higher mortgage rates and with higher down payment requirements (Wachter, 2002).[14] Moreover, as mortgage securities become more heterogeneous, there is a danger that liquidity in the mortgage market would be reduced, particularly to certain types of borrowers and places.

Finally, during periods of financial duress, the risk-based differentials would increase in the absence of mortgage-backed securities, which provide a safe haven for investors. For example, in the immediate aftermath of the 1997–1998 financial crisis and in the aftermath of 9/11, interest rate spreads related to risk widened for many corporate bonds, but the risk spreads of Fannie and Freddie securities changed very little. Similarly, in the wake of the Long-Term Capital Management financial crisis in of 1998, volumes in many debt markets fell dramatically, while they did not do so in the residential mortgage market.[15] The fact that investors perceive that Fannie Mae and Freddie Mac have implicit government backing may well have something to do with the fact that markets for residential U.S. mortgages remain liquid even in times of financial distress. The differentials in mortgage options offered to low-risk borrowers relative to high- and medium-risk borrowers would likely increase significantly in periods of financial crisis.

In short, U.S. mortgage markets would probably look quite different in the absence of Fannie Mae and Freddie Mac. Not only would interest rates probably rise for borrowers, but locking in a mortgage interest rate in advance would become harder or impossible, the menu of mortgage options might divide as mortgage pools broke up into smaller pieces with different risk characteristics, the segmented pricing of mortgages by borrower credit risk would increase, and financial markets would have one less safe haven. Perhaps most important, an entirely private market could well become one that led to an increased reliance on adjustable-rate mortgages. Work from the IMF (2004)—along with the fact that household balance sheets would be mismatched in an adjustable-rate mortgage heavy world—suggests that such an outcome could lead to macroeconomic instability.

[14] Private label mortgage rates, already higher than the rates for Fannie Mae and Freddie Mac, might even be higher in the absence of Fannie and Freddie, which provide a benchmark and hedging instruments with which the private mortgage-backed securities market trades.

[15] Lehnert, Passmore and Sherlund (2005) are skeptical, but they also point out that Fannie and Freddie bought 75 percent of the mortgages issued in the aftermath of the Russian financial crisis. This is much higher than the companies' typical market share.

Does the Implicit Government Support of Fannie Mae and Freddie Mac Create Potential Risks that May Offset any Benefits They Provide?

The implicit government guarantees for Fannie Mae and Freddie Mac create moral hazard problems; that is, risky loans may be made in the assurance that the government will not allow a default to occur. Frame and White (2005) and Jaffe (2003) both emphasize the risk of allowing Fannie Mae and Freddie Mac to borrow at a lower-than-market interest rate and suggest either the need to void the implicit subsidy so that the institutions pay the market rate of interest or to make sure that they are sufficiently tightly regulated to avoid an interest rate induced financial crisis. Obviously, an explicit removal of the implicit government guarantee would also eliminate the funding advantage that allows Fannie Mae and Freddie Mac to create such broad pools for their mortgage-backed securities and would also eliminate the market for mortgage-backed securities as a safe haven in times of financial distress. Jaffe also suggests that interest rate risk can be well-regulated, although he fears that Fannie Mae and Freddie Mac are still not regulated in a sufficiently rigorous way.

Indeed, Fannie and Freddie have added to the anxiety over risks they might pose to the U.S. Treasury by displaying inadequate accounting and financial controls (Poole, 2003). Baker-Botts (2003) performed an investigation of Freddie Mac's accounting practices at the request of that company's board of directors and had this to say:

> The Company's disclosure practices, especially as regards sensitive transactions such as Linked Swaps and those designed as a response to FAS 133, tended to produce generalized disclosures of strategies, rather than transparent disclosures of transactions. As a result, disclosure processes and practices fell below the standards required of a registered public company.[16]

To give a similar flavor for Fannie Mae, a story in the *Wall Street Journal* on March 9, 2005, reported (Hagerty, 2005):

> Fannie Mae's regulator announced that it has instructed the mortgage company to correct "deficiencies" in its controls over accounting ledgers and other corporate records. The new requirements include the adoption of policies banning falsified signatures on accounting journal entries and limiting employees' ability to alter database records.

Both companies clearly failed to perform one of the most basic functions of a publicly traded company: that is, to report earnings correctly and according to generally accepted accounting practices. At the center of these reporting problems is accounting for the derivatives that they issue and use to manage their interest rate

[16] A "linked swap" is a swap that is linked to some rate of return in the marketplace—for example, a swap that pays LIBOR plus some margin in exchange for a fixed-rate payment would be a linked swap. FAS 133 is the financial accounting standard for derivatives.

and duration risks. These particular accounting rules are complicated and controversial. But it is vital for Fannie and Freddie to manage and to report their interest rate risks well, or they could fail as did savings and loans in the 1980s crisis. The accounting and disclosure infrastructure for Fannie Mae and Freddie Mac appears to have been inadequate.

These risks from Fannie Mae and Freddie Mac are real, but there are also ways in which these institutions reduce systemic risk for the U.S. economy. The continuing liquidity of the mortgage market in recent decades has been consistent with, and perhaps has contributed to, a long period of relative macroeconomic stability (Peek and Wilcox, 2003; Wachter and Zandi, 2004). The mortgage market's ability to withstand the stress of interest rate spikes and deliver capital has likely contributed to an attenuation of the business cycle. The ability of mortgage-backed securities to offer a safe haven in times of financial stress has already been mentioned. The International Monetary Fund (2004) pointed out that as more variable-rate mortgages are used to finance housing, the more volatile is the housing market, which can induce the credit risk that raises the chance of a systemic failure. Similarly, an illiquid housing market could lead to falling housing prices, which can increase credit risk, which could induce systemic failure. Any risk that the implicit government guarantees for Fannie Mae and Freddie Mac might bring on a systemic crisis must be weighed against their ability in other settings to advance the stability of the financial system.

Conclusion

The home mortgages available to borrowers in the United States have evolved over time into a broadly available menu of choices that is not available anywhere else in the world. We believe that this menu of choices for the overwhelming majority of borrowers is possible because the U.S. mortgage system—with the implicit government guarantee for Fannie Mae and Freddie Mac—has solved the problem of how to persuade low-risk borrowers to join with higher-risk borrowers in broad mortgage pools, which provide the basis for mortgage-backed securities which can then be sliced up in financial markets.

But the benefits to mortgage borrowers come with their own set of risks: namely, the risk that Fannie Mae and Freddie Mac will malfunction in a way that will either cost the federal government a lot of money, or lead to a systematic crisis in U.S. financial markets, or both. This risk is real. But the benefits from the current U.S. system of mortgage finance for borrowers and macroeconomic stability are also real and should not be lightly discarded.

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