

# Mortgage Models, Interest Rate Risk, and the Consumer: A Four Country Comparison

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## INTRODUCTION

This paper examines the characteristics of the typical fixed-rate mortgage product in four countries and the concomitant interest rate risks and costs that they imply for the consumer. In each instance the funding, and therefore the potential duration mis-match, is handled in a different fashion. The role of the national government also varies with regard to interest rate regulation, interest rate risk management, and the management of mortgagor default risk. In our summary section we examine the benefits and drawbacks of the various systems from the home owner's perspective. The U.S.A. system is the only one that allows a home owner to fix their mortgage interest rate for a long term and allows the borrower to re-finance with no notice, no pre-payment penalty, and at any time for any reason. Moreover, the U.S.A. has the least government interference and one of the highest home ownership rates in the world at one of the lowest costs for the consumer. We think that the latter two beneficial circumstances are consequences of the consumers' ability to fix the interest rate for long periods of time and the low cost of the embedded pre-payment option. In a sense, the core of the paper is summarized in Table 1 while the rest is explanation. The countries we consider are Denmark, Canada, the U.S.A., and The Netherlands.

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## THE BASIC FUNDING SOURCES: EUROPE VS. AMERICA

European property and mortgage markets are structurally very different from each other and the North American markets. They differ in the diversity of the types of lenders and in their mortgage product variety. Property and mortgage markets remain intrinsically domestic in Europe even though the European Union is moving toward the creation of a potentially deep and liquid single capital market. While the European capital markets fund house purchases with mortgage bonds and mortgage-backed securities, time and demand deposits remain the most common source of funds for lending purposes (e.g., deposits with agreed upon maturity, deposits redeemable at notice, or overnight deposits). The European Monetary Fund estimates that retail deposits fund about 65% of residential liens with approximately 60% of mortgage credit still being granted by mortgage-specific firms<sup>1</sup>.

A very common European funding method is via mortgage-backed bonds. They were first issued during the eighteenth century and they can vary quite a bit. Mortgage-backed bonds are secured debt securities issued by mortgage credit institutions supported by certain types of assets, usually residential mortgages, that remain on the balance sheet of the issuer. The originating institution retains the credit risk associated with the underlying mortgages. It may be removed by the use of a synthetic credit-linked derivative much more complex

than the guarantee fee mechanism used in the mortgage-backed security (or via a senior/subordinate structure). The use of mortgage-backed securities (MBSs), by contrast, involves the sale of liens and their removal from the originating institution's balance sheet. With an MBS the originating firm retains any excess interest over the all-in cost of the securitization but removes the loans and any associated capital requirement from its balance sheet. This is the dominant form of providing funds for residential home purchasing in the U.S.A.

Because of the nature of the assets, and the accompanying enabling legislation, a mortgage-backed bond (MBB) provides its holder with a special degree of security. This dramatically reduces the default risk to the bond holder. Hence, the issuance of MBBs allows lenders to obtain funding at a reduced cost thereby making it a cost-effective technique for home loan funding. In Europe the issuance of MBBs is the second most important type of funding method after retail deposits. About 25% of residential liens outstanding are supported in this fashion<sup>1</sup>.

Interest rate risk management and the role of the national government is briefly indicated in Table 1. We will discuss each country's basic mortgage product, funding mechanisms, methods of insuring against default (though not local underwriting criteria), and interest rate risk in turn. In our final section we review each country to examine the complexity, costs, and benefits to their home owning publics.

**Table 1 Characteristics of Fixed-Rate Mortgages and Interest Rate Risk**

	DENMARK	CANADA	USA	HOLLAND
<b>INTEREST RATE RISK FOR THE MORTGAGOR</b>	LOW	HIGH	MINIMAL	HIGH
<b>TYPICAL PRODUCT</b>	10-30-years, fixed-rate	5-year note rate term; 25-year amortization term	30-year fixed rate	30-year interest only
<b>FUNDING METHOD</b>	<ul style="list-style-type: none"> <li>• MBBs</li> <li>• Some short-term Euro bullet bonds for ARMS<sup>b</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Term and Demand deposits</li> <li>• Many GICs<sup>c</sup></li> <li>• FEW MBSs<sup>d</sup> or MBBs</li> </ul>	<ul style="list-style-type: none"> <li>• Mainly MBSs and REMICs<sup>e</sup></li> <li>• Some Term and Demand deposits</li> </ul>	<ul style="list-style-type: none"> <li>• Savings</li> <li>• Insurance Premiums</li> <li>• Investment accounts</li> </ul>
<b>CONSUMER INTEREST RATE RISK</b>	Moderate  High level of financial complexity	High  Many “basic” products, interest rate risk upon re-financing	Low  A simple, long-term, fixed-rate no pre-payment penalty product	Medium  Interest only form plus financial payoff complexities
<b>DEFAULT RISK FOR THE INVESTOR</b>	Low  Strict underwriting standards; no government guarantee	Low  Government insurance; moderate debt-to-income and loan-to-value ratios	Low  Government and government-like insurance; private MI; uniform underwriting	Moderate  New legislation in 1995
<b>LEGISLATIVE ROLE OF THE GOVERNMENT</b>	Very high level of legislation	High, insurance and interest rate limits	Moderate; government agencies and GSEs; Private MI	Little; No legislative framework for an MBS

**NOTES:**

<sup>a</sup>MBB = Mortgage-backed bond.

<sup>b</sup>ARM = Adjustable-rate mortgage.

<sup>c</sup>GIC = Guaranteed Investment Contract.

<sup>d</sup>MBS = Mortgage-backed security.

<sup>e</sup>REMIC = Real Estate Mortgage Investment Conduit.

<sup>f</sup>LTV = Loan-to-value ratio.

<sup>g</sup>MI = Mortgage insurance.

## OVERVIEW OF THE DANISH MORTGAGE MARKET

The dominant mortgage product in Denmark is a fixed-rate, long-term, fully-amortizing, level-payment, periodic-paying, no penalty pre-payable, mortgage. While this product appears similar to the one ascendant in the American market, it is very different in two important ways. First, Danish mortgage banks are prohibited from assuming interest rate risk. Second, there is the potential for – compared to the U.S.A. – enormous financial complexity at the consumer level. This stems from the choices a potential home owner has to make regarding the raising and disbursement of their home-buying funds and the mechanisms they might utilize to protect themselves against interest rate risk. The Danes utilize MBBs to fund home acquisition. They have no MBS market.

The traditional Danish mortgage carries a fixed-rate and maturity option of 10-30 years. However, with the recent large drop in market rates, adjustable, short-term home loans have become increasingly popular both denominated in Danish krone (DKK) and in the euro (and tied to EURIBOR).

### LEGISLATION AND FUNDING

Denmark's various Mortgage Credit Acts define mortgage credit activities as the granting of loans against registered mortgages on real property from the capital obtained by issuing bonds with the value equivalent to the home loans. The current Mortgage Credit Act (MCA) requires that a mortgage bank have minimal interest and foreign exchange rate risk; an interest rate risk no more than 1% of its capital base for a market rate change of one percentage point and a exchange rate risk of not more than an amount equal to 10 bp (= 0.1%) of its capital base. The MCA also stipulates that mortgage loans for owner-occupied dwellings may not be re-paid over a period longer than that of a 30-year annuity (*i.e.*, fully-amortizing) loan. Most Danish mortgages are fixed-rate liens supported by callable bonds.

### The Basic Rules

The basic lending rules of the Danish MCA are divided into three parts<sup>2</sup>:

- The maximum maturity of the loans is thirty years.
- The maximum loan-to-value ratio for single-family dwellings is 80%, and
- The valuation of the property must be market-determined and conservative.

The following three principles characterize Danish mortgage credit<sup>2</sup>:

- All home loan lending is financed through the issuance of MBBs that are listed on the Copenhagen Stock Exchange.
- The mortgage banks must observe the *balance principle*. It ensures an equilibrium between payments received from borrowers and payments made to MBB holders (principal and interest), and
- The lending rate is market based.

In theory the mortgage banks in Denmark issue MBBs with the same nominal value and interest rate as the principal and the note rate on the home loans that the bonds finance. (These MBBs are usually issued on an open, or "tap", basis.) Each bond has a unique identification code. Re-payments of principal made by borrowers on loans require that an equal amount of face value of the bond with the same identification code be withdrawn from circulation. Thus, lending and the corresponding increase in the face value of an open series of MBBs take place under an exact balance between payments from the underlying mortgages and their matching MBBs. Therefore, the only risk of a mortgage bank is credit risk.

### TODAY'S MARKET

About 55% of the Danish population resides in owner-occupied dwellings. This is low by European standards; the European Union average is over 60%. This may be a consequence of the large quantity of subsidized rental housing and the high

quality of social housing dwellings. Amended tax rules have also greatly influenced the home ownership rates. The ability of individuals to deduct interest payments on home loans has been significantly reduced to 32% of their interest payments as compared to 65% in 1985<sup>2</sup>.

The Danish MBB market is among the largest in the world relative to Gross Domestic Product. The total amount in circulation is more than DKK 1.9 billion, approximately twice Denmark's Gross Domestic Product. MBBs amount to about 60% of their bond market. MBBs represent 80% of fixed-income securities listed on the Copenhagen Stock Exchange. The six largest MBB series represent more than 40% of the total of all MBBs outstanding.

The Danish mortgagor preference for housing funds has shifted over the last decade. Between 1990 and 1993 the mix of fixed-interest mortgages were about 60% annuity and 40% serial loans for owner-occupied homes<sup>2</sup>. Annuity loans have constant periodic payments and are the most frequently used product type. With a serial form of lien the home owner makes equal principal payments. As a consequence the interest component steadily decreases.

From mid-1993 until recently fixed-interest annuity (*i.e.*, fully-amortizing) loans have been the predominant product form. Loans can be granted to borrowers as either *cash* or *bond* loans. Until the latter half of 1996 the source of funds borrowers preferred was cash loans. For bond loans the principal of the mortgage is equal to the nominal amount of the MBBs issued to finance them. The interest payments on the lien correspond to the coupon payments on the MBBs. For a cash loan the principal amount equals the market value of the bonds and the interest rate corresponds to the yield-to-maturity. Most new home loans are being granted as bond loans because of a tax law amendment. Bond or cash loans for residential purchase can be granted in annuity or serial forms. Today the vast majority of home loans takes the form of

fixed-interest bond loans<sup>2</sup>. Since 2000 home equity loans have become available; they are known as *mortgage equity withdrawal loans*.

After 1996 the new version of an adjustable-interest mortgage was introduced. These variable-rate liens typically have an amortization term of 20- to 30-years and are re-paid by the annuity principle. However, their funding is based on short-term, non-callable bonds with a life time of 1- to 11-years but mostly 1- to 5-years<sup>2</sup>. This means that the outstanding amount needs to be refinanced by the borrower on a current basis. The mortgagor may choose whether the adjustable-rate loan has a fixed payment or a fixed term-to-maturity. Adjustable, short-term loans can have one, four, or twelve payment dates per year. Since 2000 an interest maximum guarantee has been available (*i.e.*, one can buy an interest rate cap on an adjustable-rate mortgage).

#### Variations Among Loan Types

The vast majority of liens in Denmark are annuity though serial payment and bullet (*i.e.*, non-callable) loans are also granted. Fixed-rate interest loans usually have four annual payment dates. The majority of fixed-rate mortgage loans can be pre-paid at par. In Denmark the term pre-payments covers all terminations at par – both immediate, complete, principal re-payments and those notified in advance (so that redemption occurs on a coupon payment date)—less any annulled MBBs. (An annulled MBB is one that the mortgage bank purchases in the secondary market to maintain the balance principle.) For the adjustable, short-term products the borrower takes out an annuity loan with a 20- or 30-year amortization term. The interest rate is altered at regular intervals, usually on January 1.

#### Home Loan Costs

In Denmark borrowers are charged a (credit) risk and administration fee by the mortgage bank. This fee covers management expenses (*i.e.*, servicing), loan losses, real

estate tax payments, and a contribution to the bank's reserves. The fee is charged throughout the life of the lien, on every payment date, and is 50-100 bp of the outstanding debt. The fee depends on the category of property, the security ranking of the loan, its size, and its maturity. It is tax deductible to the mortgagor. It appears that this fee is a significant component of the mortgage banks' profits as they cannot earn money off the spread between their cost of funds and the note rate on a lien.

#### PRE-PAYMENTS

The **balance principle** of the Danish MCA requires that all mortgage banks redeem MBBs, on a current basis, equivalent to their borrowers' ordinary re-payments and any extraordinary redemptions. The former represent extra principal amounts that will be re-paid on a regular payment date with the bank being notified in advance. The latter represent extra principal amounts that will be re-paid on other than an ordinary settlement date without prior warning to the mortgage bank<sup>3</sup>. The information on pre-payments is updated and rapidly published enabling investors to better assess their pre-payment risk.

In the case of immediate redemption the borrower is not required to wait to buy back their home loan until the next settlement date. However, the borrower must pay the mortgage bank the interest amount lost over the period from the actual date of redemption until the (ordinary settlement) date as of when the lien could have been redeemed were it a notified pre-payment. Callable loans may be redeemed with the appropriate MBBs; alternatively the borrower can redeem the loan for an amount equivalent to the outstanding MBB debt at par value. While the normal procedure is notified redemption at par of the MBBs, or the equivalent amount of funds, the market price of the MBBs should not be ignored. Indeed, the factor determining the choice of cash redemption on an ordinary settlement date or redemption via bonds without notification is

whether the market price of the bonds associated with the home loan to be paid off is above or below par. MBBs selling at a discount can offer a less expensive alternative to pre-payment (remember that the interest differential will be due in this instance).

#### OVERVIEW OF THE CANADIAN MORTGAGE MARKET

The Canadians primarily use a fixed-rate, short- to intermediate-term, partially-amortizing, level-payment, periodic repaying, mortgage instrument with a pre-payment penalty, for their home loan. Considerable volatility along the Canadian yield curve has resulted in a movement away from a long-term, fixed-rate, mortgage product to a short- or medium-term outlook. Even though the interest payment is not fixed, these are all still long-term, fully-amortizing, mortgage products. Moreover, the Canadian Federal Government has been, and continues to be, much more involved in the primary mortgage market than is the case in the U.S.A. For example, in Canada one out of three homes has mortgages which are Government-insured. In addition, the Government both provides monies for home loans by borrowing in the capital markets (and used to set home loan rates)<sup>4</sup>. Finally, Canada has a small, and very recent, MBS market and an even smaller and newer MBB market. Hence, the bulk of the funding for mortgages is the time and demand deposits of retail bank customers<sup>5</sup>.

#### LEGISLATION

As in the U.S.A., during the early part of the twentieth century Canadian mortgage financing was characterized by high down payment, short-term, interest-only, home loans. These were paid periodically (generally monthly) for a set period of time. Partial re-payments of principal seldom occurred; rather, the entire, original, principal balance was to be re-paid (or refinanced) upon maturity. Since these liens

had a substantial down payment requirement, the mortgagor's income was the security for the periodic interest payments and the property served as protection for the debt (*i.e.*, the principal amount). Following the failure of this system during the Depression a new home loan product wherein periodic payment of both interest and principal occurred during the term of the home loan became the standard. This is the familiar, fixed-rate, long-term, fully-amortizing, level-payment, periodic-paying, mortgage. This product type was the rule in residential mortgage lending for almost thirty-five years (*ca.* 1935-19704).

#### Default Insurance

Another major innovation during the period 1935-1970 was the use of default insurance. To increase the supply of funds for home loan purchases the Government motivated financial institutions to increase their participation by reducing the risk of loss in the event of default. The Canadian Government continues to insure against default today. Borrowers pay fees into an insurance fund established and managed by the Government. Monies from this fund are used to compensate lenders when default occurs. The insurance program played a major role in attracting new lenders to the mortgage market, particularly the chartered banks<sup>4</sup>.

#### More on Legislation

The Canadian Mortgage and Housing Corporation Act (1945) established the Canadian Mortgage and Housing Corporation (CMHC) as a Crown Corporation (implying that its debt obligations carry the full faith and credit guarantee of the Government of Canada) to administer, on behalf of the Government, the Federal participation in housing as described by the National Housing Act of 1944. The CMHC provides mortgage credit Insurance to protect National Housing Act (NHA) "Approved Lenders" from default. Today the CMHC (and GE Capital), much as Ginnie Mae in the U.S.A., insures MBS owners against default by the issuers/servicers as well as the mortgagors.

Over time, to bring about an increase in private funds and shift toward private lending, three major innovations were introduced in the various revisions of the NHA. In 1954 joint lending was replaced by Government-insured loans with the full amount of the funds to be provided by commercial lenders. The CMHC acts as the insurer and charges a one time fee varying with the loan-to-value ratio. The CMHC's underwriting standards will only allow a borrower to spend up to 32% of their gross income on shelter obligations and no more than a total of 40% on shelter and non-shelter related periodic financial obligations combined (the corresponding conforming loan percentages are 28% and 32% respectively in the U.S.A.)

Secondly, the Bank Act was changed to permit chartered banks to lend on insured mortgages. The chartered banks and Quebec saving banks, as well as insurance, loan, credit union, and trust companies are approved lenders. After this change an increased supply of home loans became available almost everywhere in Canada.

Finally, in 1967, the Bank Act was amended to remove the interest rate constraint that had been imposed on mortgagees. At the same time the banks were permitted to participate in the conventional and NHA-insured mortgage markets. Provision was also made to establish a secondary market for insured loans to both supply an increasing amount of monies for residential home purchases and to enhance the liquidity of whole loan trading<sup>4</sup>.

#### Inflation

At the end of the 1960s a rapid inflation corresponded to a period of rising consumer demand. Nominal interest rates rose and long-term lenders found themselves faced with a huge duration mismatch. Moreover, in Canada, individual borrowers had been protected by interest rate caps granted by the Canada Interest Act. Mortgage lenders had no such protection from being locked-in to long-term loans at interest rates below the higher, current ones. The 31% (9% per year to 11.8% per year) increase in conventional

note rates in the three-year period commencing January, 1972 illustrates the amplitude of the problem. The 75% (12.5% per year to 21.5% per year) rise that occurred between September, 1979 and September, 1981 exacerbated the difficulty<sup>4</sup>.

Such dramatic increases in monthly mortgage payments, particularly during the 1982 recession, had severe consequences for home ownership in Canada. This can be seen by the claims made on the default insurance funds established under the various National Housing Acts. From the fund's inception the default insurance fund grew steadily with revenues consistently exceeding expenditures. However, starting in 1979 and continuing to 1983, claims greatly exceeded revenue. For example, in 1983 revenue to the fund was \$89.4 million while expenses were \$349.7 million<sup>4</sup>. To accommodate lenders a new form of lien was developed known as a *partially-amortized mortgage* and it emerged as the most general form of home loan. This instrument passes intermediate-term interest rate risk to the home owner.

With this vehicle the lien amortizes over a long period of time but matures, that is re-prices, on a short- or intermediate-term basis. At maturity the full amount of the outstanding balance must be re-paid or re-financed at the market interest rate. Because the short-term, partially-amortized, mortgage permits the periodic re-adjustment of note rates this allows the lenders to better match the interest rates that they offer on their liabilities (*e.g.*, time and demand deposits plus a multitude of Guaranteed Investment Contracts) and their assets (*e.g.*, mortgages). Of course it simultaneously forces the home owner to bear the burden of interest rate volatility. In an attempt to reduce the turmoil caused by this instability, the Government introduced an interest rate insurance program in 1984. Borrowers could purchase insurance against having to make payments based on an interest rate that is more than a specified number of percentage points greater than the rate specified in the original mortgage (*i.e.*, they could buy an interest rate cap).

Independently, the CMHC launched a new program in 1987—the NHA Mortgage-Backed Security (MBS). This program was designed to help provide a steady flow of mortgage funds into housing in Canada by increasing liquidity in secondary market trading. The NHA MBS was explicitly modeled after the U.S.A.'s Ginnie Mae version. Today there is about \$75 billion outstanding in this form (roughly 5% of the market). The CMHC's role was expanded to include the provision of the unconditional guarantee of timely payment of interest and principal when pools of these insured mortgages were created. This CMHC guarantee is in effect a guarantee of the Government of Canada.

#### Mortgage Funding

The residential mortgage market has been increasingly funded by the banks; rising almost linearly from 11% in 1971 to 55% in 1996<sup>4</sup>. The principal source of funds for home buying in Canada is the deposits of the Canadian populace. The banks primarily use some version of a *Guaranteed Investment Certificate* (GIC) to entice savers to invest in products which provide monies for home purchasing. These GICs come in a wide variety of forms.

Lenders cannot normally make a loan which is more than 75% of the market value of a house unless the lien is insured by the CMHC or GE Capital. Mortgage default insurance may be available for loans up to 95% of the property's value. The residential mortgage market comprises approximately one-quarter of Canada's domestic capital markets. The Canadian homeownership rate is about 65% while over half of Canadian households own their own homes outright<sup>5</sup>. In Canada, *neither real estate tax payments nor mortgage interest is tax-deductible*.

#### LOAN TYPES and PRE-PAYMENTS

An "Open Mortgage" typically has a 6-month or 1-year term. This product allows borrowers to re-pay, at any time, without a pre-payment penalty. A "Closed Mortgage" normally has a 1- to 5-year term (but typically a 25-year amortization period). The

fixed-rate product can be paid at a frequency varying from weekly to monthly. This type of lien cannot be pre-paid nor discharged before the end of its term without the borrower having to pay a significant penalty (typically three months' interest) except on the sale of their property (a "due-on-sale" clause). Closed mortgages may have a penalty-free pre-payment option of 10-20% of the original principal amount or a maximum monthly "double-up" payment solely allocated to outstanding principal balance reduction. There are many other variations.

A "Variable-Rate Mortgage" or "Adjustable-Rate Mortgage", with a term of 6-months to 1-year, has an interest rate directly linked to money market rates. With a variable-rate mortgage the monthly payments are still fixed but, as the current interest rate goes up, a larger portion of the regularly scheduled payment will be applied toward the interest component; the converse would apply in a falling interest rate scenario.

The up front costs of home buying in Canada are comparable to those in the U.S.A. The lack of mortgage interest and real estate tax deductibility raises the effective ongoing cost by the home owner's marginal tax rate. In addition, the absence of a long-term, fixed-rate lien passes interest rate risk onto the home owner.

#### OVERVIEW OF THE U.S.A. MORTGAGE MARKET

The basic instrument in the U.S.A. was created by the Federal Housing Administration seventy years ago; it is the fixed-rate, fully-amortizing, long-term, monthly-paying, level-payment, no pre-payment penalty, mortgage with an American-style call option embedded in it. Although there is no national housing legislation in the U.S.A. comparable to that in Denmark or Canada, there has been Federal Government involvement, in several ways, to minimize default risk and to enhance liquidity in the secondary market. As a result, the residential housing finance system in the United States has evolved from several different components.

To understand the current American mortgage market one needs to remember the crisis in the Savings and Loan associations, or thrifts, during the 1980s and before that the problems which stemmed from the Depression. Between the 1930s and 1970s the thrifts funded long-term, fixed-rate, liens on the basis of short-term, and hence variable-rate, deposits. The result was a lack of liquidity and duration mis-match resulting from the mistake of borrowing short-term and lending long-term. Nonetheless, this system worked well in a time of stable interest rates. Many thrifts collapsed after 1979 following the sharp increase in the absolute level and volatility of short- and long-term interest rates. Much of the Savings and Loan industry's capital was wiped out between 1979 and 1981 when 20% per year interest rates prevailed<sup>5</sup>. Those thrifts that survived realized that fixed-rate loans are exposed to a high level of interest rate risk and therefore should not be held on their balance sheet but instead be sold into the secondary market. This change in mode of business greatly expanded the role of the government-sponsored enterprises that had been created in the late 1960s.

#### MARKET STRUCTURE

The U.S.A. has a primary residential mortgage market for the retail origination of single-family loans whose collateral is real property [that is the land and the building(s) on it]. Savings banks and savings and loan (or thrift) institutions were the main sources of funds for this purpose—utilizing the balances of their depositors. While deposits are still a source of funds today, the capital markets provide most of the monies for housing loans via the privately owned, government-sponsored enterprises (GSEs) like Fannie Mae, Freddie Mac, and the Federal Home Loan Banks. Separately, the Federal Government fully guarantees the mortgages packaged into securities by Ginnie Mae. This structure explains the subdivisions of U.S.A. home loans based on whether or not the loan is conventional or non-conventional (i.e., not insured vs. insured by the Federal Government) and conforming or non-conforming (i.e., not exceeding vs. exceeding an amount

computed by a formula that takes into account changes in home prices). Independently there is a totally private market involving the banks, other secondary market conduits, and the mortgage bankers and brokers.

Together these components of the secondary residential mortgage market provide the links between the primary residential mortgage market and the capital markets. The government-sponsored enterprises especially facilitate the flow of funds from investors in mortgage-derivative securities to the primary housing market. Pass-through, mortgage-backed securities (MBSs), are the main type of funding instrument used by the GSEs. The Federal Home Loan Banks, which are wholesale banks, facilitate a deposit-based system of savings and commercial banks, savings and loan institutions, credit unions, and life insurance companies with corporate debt. Among them additional liquidity is provided for the financing of the construction of, and the sale of, residential housing.

The secondary mortgage market is chiefly devoted to whole loan sales. Commercial banks, life insurance companies, pension funds, Wall Street dealers (who issue whole-loan and private-label MBSs, structure more complex REMIC deals, and so forth), are active in the secondary market as are the GSEs. There is also a part of the secondary market which deals with less than excellent credit rated loans, home equity loans or second mortgages, and liens on manufactured housing.

#### **Advantages of the Secondary Market and Funding**

The U.S.A. secondary residential mortgage market and particularly the GSEs:

- Assist in smoothing out imbalances in the availability of mortgage funds across a geographically large, economically diverse, country.
- Allow lenders to originate mortgages for sale rather than retain them for portfolio investment. This frees their capital and permits them to structure their balance

sheets in risk-minimizing, profit-maximizing, ways. Also, by re-supplying the banks' funds, they can originate more mortgages thereby increasing their fee-related income.

- Attract investors to mortgage-related investments via standardized product definition, underwriting, and MBSs backed with homogeneous collateral.
- Provide greater liquidity by financially engineering securities to meet the cash flow needs of investors (e.g., stripped MBSs and REMICs; a REMIC is a multi-class, structured-security backed by MBSs).
- Increase the affordability of home owning by creating a larger supply of less expensive funds with Government or GSE credit guarantees, and
- Closely tie mortgage rates to other fixed-income interest rates (particularly the 10-year U.S. Treasury Note).

Finally, another advantage of the GSE-sponsored MBS markets is that there exists a very wide range of retail products. Fifteen-, 20-, and 30-year fixed-rate, 30-year floating-rate, various hybrid types, re-set balloon, government-guaranteed, and so on are all available to be pooled into MBSs or REMIC classes. This means that short-, intermediate-, and long-term REMIC tranches may be carved out to satisfy investor demand. Hence, sundry investor requirements with respect to interest rate, credit, and pre-payment risk can be met by the various classes of a REMIC.

Private conduits also purchase mortgages to re-package them and sell them to fixed-income investors. In addition, private conduits provide a secondary market in the non-conforming and *sub-prime* (less than good to excellent credit) markets. Whole-loan conduits also specialize in transforming conventional mortgages that exceed the lending limits imposed on the GSEs into whole-loan securities, dealing with liens from borrowers with less than perfect credit ratings, home equity loans, second mortgages, home improvement

loans, and so on. MBSs not issued by GSEs (the so-called non-agency MBSs) have much wider spreads in term-to-maturity, coupon rates, and so on than agency versions (e.g., mixing 15- and 30-year liens together). In addition, whole-loan MBSs typically have external (i.e., private) insurance guarantees or internal credit enhancements (e.g., via a senior/subordinate structure) to allay the fears of investors with respect to default risk.

#### **LEGISLATION**

The U.S.A. Congress created the Federal Housing Administration as part of the passage of the National Housing Act (NHA) of 1934. The Federal Housing Administration encouraged investors to lend for residential home purchasing by offering them default insurance. However, only those mortgages (and borrowers) that conformed to the FHA's homogeneous underwriting standards could be eligible. Thus, the FHA created the first uniform mortgage application and underwriting requirements. This standardization dramatically increased the efficiency and liquidity of the secondary mortgage market. In addition, the FHA invented and promoted the fixed-rate, fully-amortizing, long-term, level-payment, monthly-paying, home loan. The standard term of 30-years meant manageable monthly payments. The fixed-rate/level-payment aspects stabilized housing expense making it easier for consumers to budget. The complete amortization feature meant that the home owner would (albeit slowly at first) build up equity in their property and eventually to own it outright.

In 1938 the U.S. Congress created the Federal National Mortgage Association to supply the credit guarantee and liquidity to the secondary mortgage market. In 1968 Congress divided this organization into two: A government-sponsored derivative, now known as Fannie Mae (a federally chartered corporation owned by private shareholders), and the still wholly Government-owned and controlled Government National Mortgage Association or Ginnie Mae. Ginnie Mae took

over the old Fannie Mae's responsibilities with respect to the government-insured mortgage market. Ginnie Mae securities are backed by the full faith and credit of the United States Government.

The partially privatized Fannie Mae was made fully private in 1970 and authorized to purchase conforming loans. Thus, there was a government agency to support government-insured loans and a GSE to support non-government insured loans (up to an independently mandated maximum loan amount).

Ginnie Mae created the first publicly traded pass-through security in 1970. This instrument enabled bankers to sell mortgages in larger volumes to new mortgage investors. It also brought about greater liquidity than had existed in the whole loan market. Separately, in 1970, Congress created Freddie Mac to provide further liquidity to the conventional secondary residential mortgage market. Initially Freddie Mac was a government-chartered corporation owned by the twelve Federal Home Loan Banks. Freddie Mac was authorized to purchase conventional loans as well as government-guaranteed liens. Freddie Mac issued its first pass-through MBS, known as a *Participation Certificate*, in 1971. (The Bank of America issued the first whole-loan, or private, MBS in 1977.) Fannie Mae started to issue its MBS in bulk in the mid-1980s. Freddie Mac introduced the first Collateralized Mortgage Obligation (CMO) in 1983. Three years later CMOs were transformed into the more tax-advantaged, more flexible, Real Estate Mortgage Investment Conduit (REMIC) structure.

#### The Federal Home Loan Bank System

There is an entirely separate GSE home loan funding system in the U.S.A. under the aegis of the twelve Federal Home Loan Banks. These are independently operated (wholesale) banks established in 1932. The regional banks are owned by their private member institutions and the FHLBank network operates on the private capital they provide. The FHLBanks provide financing support to about 7,900 institutions: 5,750

commercial banks, 1,500 thrifts, 550 credit unions, and 50 insurance companies.

The FHLBanks raise money by issuing corporate debt. These funds, known as advances, are lent to members at lower rates than are available to these institutions individually in the commercial markets. As of mid-2001 the FHLBanks had about \$665 billion in assets and \$450 billion in advances<sup>5</sup>.

#### LOAN TYPES and PRE-PAYMENTS

Home ownership in the U.S.A. is relatively high at about 68% because of a comparatively cheap source of funds provided by the GSEs. The market for home loan securities is huge, over \$6 trillion. Most mortgages in the U.S.A. are fixed-rate, fully-amortizing, 30-year, level-paying, monthly-payment instruments. Both shorter- and longer-term product types exist as do bi-weekly payment mortgages. Adjustable-rate mortgages and various hybrid versions with mixed fixed-rate and variable-rate elements comprise approximately 20% of outstanding home loans<sup>5</sup>. The fixed-rate aspect refers to the interest rate being constant (as opposed to floating) for the life of the loan. In general there are no pre-payment penalties or time constraints on pre-payments in an American residential mortgage (*i.e.*, the home owner has the full exercise rights of an American-style call option on their debt). This option is paid for in the note rate. Fifty basis points was the typical amount that this call option used to cost the borrower (post-Russian 1988 default it has doubled).

#### THE DUTCH MORTGAGE MARKET

The mortgage market in The Netherlands has become a highly dynamic one. Substantial growth, an increasing interest in the secondary market, and a sharp rise in the variety of loan types available to consumers all illustrate the rapid changes. During most of the 1980s the *linear* and *annuity* mortgages were the most popular mortgages types. (The former has a constant periodic principal payment amount whereas the latter amortizes.) In the 1990s the *life insurance* and *savings* mortgages

became the favorite product types because of their tax advantages<sup>6</sup>. With the savings mortgages no principal is re-paid during the term of the contract. Instead, the borrower makes interest payments on a regular basis to the lender. The main benefit is that the payments are interest-only which are fully tax deductible under Dutch law. On the other hand, the return on the savings and investment accounts are, under certain conditions, not taxed. Hence, these products take optimal advantage of the Dutch tax system<sup>6</sup>. The interest re-set date on most loans is 5-10 years after origination with a 30-year amortization period, much like in Canada.

In more detail, with the savings product one pays only the interest on the mortgage amount and a premium into a saving account. It is also possible to invest one's savings as a lump sum at the beginning of the term so that there are no monthly premiums. No principal payments are made during the life of the loan; instead a one-time savings account deposit is expected to grow to equal the mortgage balance on their common maturity/due dates. The deposit earns interest and also pays the premium for a life insurance policy; another credit enhancement mechanism to guarantee the pay off of the principal. This product has significant tax advantages. The bank pays an interest amount over its standard deposit rate equal to the mortgage note rate. Hence, apart from the tax effects, a savings mortgage is comparable with an annuity mortgage. Each time the mortgage interest rate is adjusted, the savings premium will be adjusted as well in order to guarantee the insurance payoff by the due date. As the mortgage interest is coupled to the savings premium, the savings premium will get lower when interest rates rise and higher should interest rates fall.

#### TODAY'S MARKET

The benefits of the euro and a large, common, financial market have been realized in the search for home loan funds for the 16 million residents of Holland. A reason is that the Dutch Central Bank allows for favorable treatment of assets taken off balance sheet thereby encouraging the

issuance of MBSs. The first securitization of residential mortgages in The Netherlands was carried out early in 1996 profiting from both of these developments. Fifteen MBS transactions occurred up to September, 2006. During the last half of 1990s home loans amounting to euro 8.7 billion were transferred to the special purpose vehicles (SPVs) used to hold the assets. The function of the SPV is to keep the collateral separate from that of the original lending institution<sup>6</sup>.

The progress in the housing and mortgage markets in recent years has generated a sharp increase in outstanding residential mortgage debt. Mortgage debt grew by the year-end 2001 to euro 320 billion. Mortgage-backed assets in SPVs accounted for only about 10% (euro 30 billion) of the total growth in outstanding residential mortgages. This can be attributed to the fact that under Dutch law any true sale of receivables must involve the notification of the borrower. Rather than potentially antagonize their customers, most lenders are loathe to do this. Also, under the Dutch civil code, there is no concept of a trust; that is the law does not recognize a distinction between legal and beneficial ownership.

The Dutch system of tax deductibility on mortgage interest payments makes buying a property particularly attractive especially with rents rapidly increasing. Just over half of Hollanders own their own homes with their mortgage debt being the fourth largest in Europe after Germany, the UK, and France. The Dutch fiscal system also allows tax deductibility on a range of costs associated with the initial purchase of a property. For the consumer, buying a house is expensive; the closing costs are approximately 25% of the price. These are composed of a value added tax of 17.5%, legal transfer costs of 6%, real estate agent fees of 1.5-2.5%, and notary fees of 1.5%. The per capita home loan debt in The Netherlands is the second highest in Europe after that of the Danes with loan-to-value ratios normally 80-85% at the time of purchase<sup>6</sup>.

The usual rule-of-thumb in the Dutch market is that one can borrow up to four

times their annual income. In certain circumstances the limit is 125% of the "execution value" of the property. This amount is lower than the perceived actual value of the property and reflects the lowest amount the house would sell for if repossessed.

#### Pre-payments

Dutch mortgages usually have a maturity of 30-years with the interest rate fixed for a period of between 5- and 20-years. At the end of each fixed-rate period the mortgage rate is re-set to the market rate. Usually there are no caps nor floors restricting the interest rate adjustments at the re-set date. With regards to pre-payments, at least 10%, and as much as 20%, of the initial principal can be pre-paid within any calendar year without pre-payment penalties. Above the annual permitted pre-payment, additional pre-payments are settled at costs equal to the present value of the difference between the future monthly interest payments of a new contract and the existing mortgage. An additional fixed amount, of 6-14% of the outstanding principal balance, is added to this penalty. Hence, pre-payments in Holland are minimal.

### CONSUMER ISSUES

#### Types of Mortgages

As mentioned above, there are two basic types of re-payment mortgages. They are referred to in Dutch as *lineaire* and *annuïteiten*. In addition, there are two basic types of investment mortgages, savings (*spaar*) and investment (*belegging*). With the investment security one pays only the interest on the mortgage amount and a premium into an investment fund. The return on the investment account (e.g., stocks and shares) does not relate to the note rate nor to the rate of return of the insurance company. In 1998 the market share of the investment-type mortgage exceeded 50% of the newly issued home loans<sup>6</sup>. More recently, so-called "switch mortgages" have become popular. With this product mortgagors can alternate between

building up the principal amount through a savings account or by an investment account.

There is a third type of mortgage known as the non-re-payment mortgage or *aflossingsvrij*. This is an interest-only variety and is not available for the entire loan amount. Separately one makes arrangements to pay the mortgage balance on its due date. It is possible to combine the above mortgage forms and have a tailor-made mortgage.

Another variety is a life insurance mortgage where one pays interest only. The balance is made from a so-called "mixed life insurance policy" issued by an insurance firm. The outstanding amount is made on the final due date or when the insured has died. Instead of traditional mortgage payments, the mortgagor pays a monthly insurance premium. At the end of the policy term the life insurance premium plus interest is designed to pay off the home loan. Since no principal re-payments are made during the life of the loan, the interest portion remains constant computed on the full amount due.

Last is an interest-only home loan. At the mortgage's maturity the entire amount is due (i.e., a balloon mortgage). Interest-only mortgages are only granted if there is sufficient excess value in the collateral. At the end of the term, principal re-payment is made through the sale of the property, by taking out a new mortgage or by individual savings. Due to the higher credit risk, Dutch mortgagees never grant an interest-only loan that exceeds 75% of the foreclosure value of the underlying property. Often, this type of loan is used as a second mortgage (e.g., to finance renovation). In the second half of the 1990s, the interest-only and the investment mortgage became popular<sup>6</sup>.

In 1995 the National Mortgage Guarantee was established to encourage home ownership. It succeeded the municipality mortgage guarantee. It is an instrument of the Home Ownership Guarantee Fund Foundation (*Stichting Waarborgfonds Eigen Woningen*). Under certain conditions a home loan can be guaranteed against default risk.

## SUMMARY

We have surveyed four different fixed-rate home loan systems. All of them with fixed-rate home loans and some government intervention in the mortgage markets. The Danish borrower has a fairly sophisticated financing decision to make between bond and cash loans (over and above the fixed-vs. adjustable-rate choice). Moreover, should they choose to re-finance, they again have a complex computation to perform to validate that re-financing is really the best economic choice. Finally, the ongoing fees associated with loan servicing are relatively high. In contrast the Canadian mortgagor fully faces interest rate risk with the intermediate-term, partially-amortizing, product plus a slew of pre-penalty options which depend on frequency, amount, and so forth. Because of the high volatility of Canadian interest rates home owners there are typically paying more than home owners in the other countries we have discussed for their housing funds. While investors in Canadian mortgages are reasonably well protected, the high costs associated with this protection are fully borne by the home owner and, potentially, the Canadian government.

In Holland the wide variety of, effectively, interest-only, home loans in connection with their tax advantages, attracts many consumers. Not only can their periodic housing payments be minimized, the attractiveness of this feature is enhanced by the tax laws. However, any buildup of equity in their property would be minimized and postponed. Hence, "home ownership" does not necessarily mean quite the same thing in Holland as in the other countries we have examined. Given the simplicity of the process, lack of interest rate risk, relatively low level of government involvement, it appears that the consumer in the best overall situation is the American one, especially with regard to pre-payments or curtailments.

In the U.S.A., because of the no pre-payment penalty nature of the standard 30-year, fixed-rate product, re-financing rates have risen to all-time highs as interest rates have fallen to forty year lows. (Re-financing

is a third higher than the previous record levels set during 1997-98 with almost \$3 trillion re-financed in 2002<sup>7</sup>.) In addition, the huge benefits that the American home owner derives from the multiplicity of competing funding systems and default insurance programs (i.e., Government, GSE, and fully private) have kept home loan rates low, and uniform, across a geographically large area for a European-sized population. The large, integrated, capital market with a variety of investment mechanisms, especially MBSs, has diversified funding sources and spread interest rate (and pre-payment) risks while the tripartite guarantee business has kept costs for home owners down and government intervention low.

<sup>5</sup>Taff, L.G., *Investing in Mortgage Securities*, is the main source of the material on the American market. St. Lucie Press, 2003.

<sup>6</sup>The Netherlands Bankers' Association and the Nederlandse Bankeirsverenigin Web sites were very useful sources of information for this section.

<sup>7</sup>Washington Post, December 27, 2002, pg. E1.

## NOTES

<sup>1</sup> See the article by Judith Hardt, "European Mortgage Markets: Structure, Funding and Future Development," in European Mortgage Federation, 2000.

<sup>2</sup> The Association of Danish Mortgage Banks, *Realkrediraadet*, is a good source for general information on the Danish mortgage market (their Web address is [www.realkrediraadet.dk](http://www.realkrediraadet.dk)). There one can find English versions of their publications *Danish Mortgage Bonds and Mortgage Financing in Denmark*. The basic reference is the Danish Mortgage Credit Act itself.

<sup>3</sup> Typically this is accomplished by the home owner purchasing the desired amount of outstanding MBBs, from the relevant series, themselves and turning them into the mortgage bank to diminish, or eliminate, their outstanding mortgage debt.

<sup>4</sup> The Canada Mortgage Housing Corporation is a useful resource especially its publication on *Canada's Housing System and The NHA Mortgage-Backed Securities* document. Its Web address is [www.cmhc-schl.gc.ca](http://www.cmhc-schl.gc.ca). [www.canadamortgage.com](http://www.canadamortgage.com) has an excellent set of resources too as do several other Canadian commercial bank Web-sites such as [www.mortgage-made-easy.com](http://www.mortgage-made-easy.com) and [www.great-mortgages.com](http://www.great-mortgages.com) (the Ontario Mortgage Centre Ltd.)