

THE DEVELOPING MORTGAGE MARKET IN TURKEY: THE KEY ISSUES IN THE CREATION OF THE SECONDARY MARKET

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ABSTRACT

During the last decade, state-owned banks have dominated the housing finance market in Turkey. Emlak Bank has been the leading lender with investments in expanding housing credits. In 1998, Emlak Bank introduced the civil servants' wage-indexed housing loan (WIHL) in order to facilitate housing finance for the middle-income population. In this study, the performance of the WIHL contract in comparison with the standard mortgages of inflationary economies is examined using data between 1998 and 2003. We find that WIHL is an innovative contract for the high inflation periods in Turkey as it provides insulation against highly volatile interest rates. However, recent years have witnessed moderate inflation, which has encouraged new developments in the housing finance sector. If stable economic conditions persist, mortgages of moderate inflationary environments can be originated safely for the long-term. An active primary mortgage market in conjunction with supportive government policies are essential elements for the creation of a secondary market, which would facilitate the long-term lending risk to be shared by private sector investors and government-sponsored agencies.

Key words: mortgage markets, housing finance, inflationary economies, civil servants' wage-indexed housing loans.

TÜRKİYE'DE MORTGAGE PİYASASININ GELİŞTİRİLMESİ: İKİNCİL PİYASA OLUŞUMUNDAKİ TEMEL UNSURLAR

ÖZET

Son on yılda, Türkiye'deki konut finansmanı sektörüne devlet bankaları hakim olmuştur. Bu süreç içerisinde Emlak Bankası, konut kredilerine olan yatırımlarını arttırarak sektörde lider banka olarak yer almıştır. Emlak Bankası, 1998 yılında memur maaşına endeksli konut kredilerini piyasaya sürmüştür. Bu kredi kontratı, özellikle orta gelirli sınıfının konut finansman sorununun çözümlenmesi amacıyla tasarlanmıştır. Bu çalışmada, 1998 ve 2003 yılları arasındaki veriler kullanılarak, memur maaşı endeksli konut kredisinin performansı diğer enflasyonist ekonomilerde kullanılan standart mortgage (ipotekli gayrimenkul kredisi) kontratları ile karşılaştırılmıştır. Elde edilen sonuç, memur

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maaşı endeksli konut kredisinin hem tüketici hem de kredi veren kuruluşu değişken faiz oranlarından koruduğu ve bu nedenle yüksek enflasyon ortamında yenilikçi bir kontrat olduğudur. Son bir kaç yıl içerisinde Türkiye ekonomisinde yaşanan olumlu gelişmeler, konut finansmanı sektöründe yeni gelişmeleri teşvik edici niteliktedir. Günümüzdeki ekonomik istikrarın uzun bir süre devam etmesi durumunda, düşük enflasyon ortamında kullanılan uzun dönemli mortgage'ların ülkemizde de güvenilir bir şekilde piyasaya sürülmesi mümkün hale gelecektir. Aktif olarak işleyen birincil mortgage piyasası ve bunu destekleyen devlet politikaları, ikincil piyasanın kurulması için gerekli ön koşullardır. İkincil mortgage piyasası ile uzun vadeli kredilendirme risklerinin özel sektör yatırımcıları ve devlet kurumları arasında paylaşılması sağlanacaktır.

Anahtar kelimeler: *mortgage piyasaları, konut finansmanı, enflasyonist ekonomiler, memur maaşı endeksli konut kredisi.*

In emerging economies, such as Turkey, periods of rapid changes in inflation are often accompanied by fluctuating interest rates. Because changes in interest rates raise the social cost of the standard fixed-rate mortgage (FRM) contract of developed economies, the inflationary environment creates incentives for developing alternative mortgage instruments. Thus, inflation-indexed mortgages, such as the Price Level Adjusted Mortgage (PLAM) and the indexed units of account (UDI) mortgage, and the dual-index mortgage (DIM) contract have become more popular in comparison to the standard FRM contract under highly volatile economic conditions.

Most of the emerging economies have experienced the traditional mortgage lending system (primary mortgage system), in which all the mortgage market functions are vertically integrated within a single depository institution. Only recently have some developing countries, such as China, Hong Kong, Singapore, Israel, and Poland, given importance to establishing a secondary market for mortgages. It is basically the success of the secondary mortgage market in the United States that has led many developing countries to introduce this technique as a way of enhancing the flow of funds to the housing sector. However, the readiness of an efficient primary mortgage market as a prerequisite for the establishment of a secondary market is often overlooked. In fact, a successful secondary market development cannot proceed unless and until the primary market is able to produce a sufficient volume of high quality mortgages that meet the requirement of investors.

As an emerging market economy, Turkey has experienced the basic problem of economic instability with highly volatile inflation and fluctuating interest rates from the early 1980s to 2000s. However, in recent years the inflation rate has been cut back and brought under control. In this paper, first, we analyze the comparative performance of primary mortgage market instruments that are commonly used in other inflationary economies. In particular, we examine the default (credit) risk of alternative mortgage instruments by using the actual data representing the highly volatile economic environment in Turkey between 1998 and 2003. Then, we discuss the key issues to establish a sustainable secondary market under the circumstances that the stable economic conditions of the recent years persist for a certain period of time.

The remainder of the paper proceeds as follows. The next section outlines the mortgage markets and instruments both in developed and developing economies. The third section, first, examines the housing finance sector in Turkey in terms of the macroeconomic environment and mortgage instruments. Then it focuses on the residential lending system of Emlak Bank, which has been the leading lender during the last decade. This section, lastly, explains the wage-indexed housing loan (WIHL) contract that was originated by Emlak Bank in 1998 and compares the performance of this

specific contract design with the standard mortgage contracts under the volatile economic environment in Turkey. In the fourth section, we describe the general primary mortgage market prerequisites for the development of a successful secondary market. This section also provides a discussion of establishing a secondary mortgage market in Turkey in the near future. The final section presents some concluding remarks.

AN OVERVIEW OF MORTGAGE MARKETS

A mortgage loan, or simply mortgage, is a loan secured by real property as collateral. The word *mortgage* comes from two Middle English words: *gage* meant an obligation or commitment, while *mort* referred to death or dying. Hence, a “dying commitment,” that is, a commitment that is not permanent, but has a finite life. A mortgage obliges the borrower to make a predetermined series of payments. If the borrower defaults (fails to make the contracted payments), the mortgage gives the lender the right to foreclose on the loan and seize the property in order to ensure that the debt is paid off (Geltner and Miller, 2001).

In most developed economies, especially in the US economy, the importance of the mortgage markets has been recognized widely and analyzed in the academic literature. This is because the mortgage market became the largest component of the fixed income market in the US capital markets.⁽¹⁾ Mortgage market development is a key factor in overall financial market development. An efficient mortgage market acts as a positive externality for the other capital markets, creating pressure for higher efficiency in these markets. On the other hand, a poorly functioning mortgage market is likely to pollute other financial markets with its inefficiency (Jaffe and Renaud, 1997).

In the United States and the United Kingdom (UK), prior to the 1980s, most housing loans were made by depository institutions, including commercial banks, savings and loan associations in the US, and the building societies in the UK. In a depository institution system, which is also called a primary mortgage system, all the mortgage market functions can be integrated vertically within the depository institution. In a depository institution structure, it is the particular form of the mortgage instrument that determines how the various risks are shared between the lender and borrower. For example, in the US mortgage market, before the 1980s, thrift institutions dominated the funding of residential mortgages.⁽²⁾ Thrifts were constrained by regulation and provided incentive to invest almost exclusively in 30-year fixed-rate, level payment mortgages (FRMs) funded by insured deposits. During the 1980s, financial deregulation and the elimination of interest rate ceilings improved the financing options and the supply of credit available to house buyers. Deregulation facilitated the introduction of adjustable rate mortgages (ARMs), which improved affordability for borrowers (Diamond and Lea, 1992a). In the UK mortgage market, the most popular form of mortgage was a 25-year, reviewable-rate endowment loan. The endowment mortgage contract is an interest-only loan. When the borrower issues this loan, he takes out a life insurance policy, which at maturity repays the principal balance on the loan. Endowment mortgages account for more than 75% of the total mortgage loans, with more traditional fixed payment amortizing mortgages accounting for less than 20% of the market. ARM loans with adjustment periods of up to five years were also being offered as an alternative housing finance instrument (Diamond and Lea, 1992b)

The 1980s witnessed new developments in the mortgage finance systems, and secondary mortgage markets (SMMs) emerged in the developed economies as a solution for handling risk in the housing finance sector. In the SMM system, the mortgages are first originated by depository institutions or other mortgage bankers, but are then sold to financial investors, who hold the mortgages. There are different forms of SMM systems, based on differences in the instruments used for the mortgage sale and in the type of investors or institutions who buy the mortgages. In many developed countries, the SMM is dominated by large institutions which specialize in either purchasing mortgages or in lending funds to the institutions that hold the mortgages. In the United States, there are two government-sponsored agencies, the Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac), which purchase mortgages directly from originators. Another government agency, the Federal Home Loan Banks, supports the mortgage market by lending funds to depository institutions, which then hold the mortgages. Mortgage securitization, another form for the SMM, has developed very rapidly in the United States and is used occasionally in Europe (Jaffee and Renaud, 1997; and Lea, 2000). In the mortgage-backed securities market structure, financial institutions purchase mortgages from an originator, then the purchased mortgages are combined to form a mortgage pool and shares in the cash flow of the mortgage pool are sold to investors as mortgage securities (see Fabozzi and Modigliani [1992] for mortgage-backed securities).

In emerging economies, the provision of housing finance is very problematic because of the volatile macroeconomic environment and the lack of legal and regulatory framework that supports collateralized lending. In an inflationary environment, financing the long-term mortgage loans creates significant lending risks for mortgage lenders: (i) Legal risk, (ii) Credit risk, (iii) Interest rate risk, and (iv) Liquidity risk. Although the developed economies are now able to manage these lending risks through their specialized financial instruments and markets, the developing economies are still struggling with long-term lending risks, and how to regulate and manage the housing finance sector.

Legal Risk: The property rights and foreclosure procedures that are needed for real estate to function as loan collateral are not well established in the legal and institutional structures of the developing economies. Erbaş and Nofthafft (2002) state that the developing countries have to pursue legal reforms because property rights, entitlement, eviction, and loan recovery are still on questionable legal grounds. According to the authors, property rights have to be clear and enforceable. If it is impossible to enforce the contracts, then lenders cannot move the households from their houses when they default. Thus, incomplete collateral and foreclosures laws create high lending risks for mortgage lenders.

Credit Risk: In developed mortgage markets, the risk of default on a real estate loan, or credit risk, usually is measured by two ratios. The payment-to-income ratio: the ratio of the annual mortgage payment to the borrower's annual income, and the loan to value ratio: the ratio of the mortgage loan amount to the property value. In developing economies, one of the primary problems is that average income to property value ratios tend to be considerably lower than those in the developed economies.⁽³⁾ The low-income levels make housing loans extremely risky assets for mortgage lenders. The particular form of mortgage instrument is inflation-indexed mortgages; however, it is often the case that wage rates do not keep pace with inflation, especially in the short run, resulting in excessive payment burden for inflation-indexed mortgage loans (Manchester, 1985). Thus, payment burden is a major cause of mortgage loan defaults, particularly in illiquid housing markets. Like payment

burden, equity erosion of the borrowers is another cause of mortgage loan defaults. Changes in the market value of the house often lag behind inflation, causing the erosion of the borrower's home equity, when inflation-indexed mortgages experience significant growth in loan balances (Lipscomb and Hunt, 1999). Since it is difficult to develop accurate methods of estimating property values under highly volatile inflationary conditions, the collateral values for loans may become inadequate when assets are incorrectly valued, resulting in too high loan-to-value ratios.

Interest Rate Risk: In developed economies, mortgage lenders are sometimes short funded. The short funding occurs when the maturity of the mortgage assets exceeds the maturity of the funding sources (such as bank deposits) of the lenders. While mortgage borrowers generally wish to match their durable housing assets with long-term mortgage loans, the depositors prefer the liquidity of short-term investments. The short funding creates an interest rate risk for lenders because an increase in market interest rates raises the cost of deposits without immediately raising the return on the mortgage assets. Developed economies can manage to hedge against interest rate risk using capital market instruments, but they have a high cost, approximately equal to the difference between short-term and long-term interest rates. Alternatively, the interest rate risk can be controlled using variable rate mortgages, but these instruments only transfer the interest rate risk to the borrower. In developing economies, capital market instruments are not available to hedge the interest rate risk; therefore, the variable rate mortgages are developed as the only solution for dealing with interest rate risk. Since these mortgage instruments totally transfer the interest rate risk to the borrowers and increase their incentive to default, variable rate mortgages tend to transform the banks' interest rate risk into credit risk (Jaffee and Renaud, 1997).

Liquidity Risk: The depositors in developing economies are likely to value liquidity, reflecting the high risks associated with the macro-economy, and the consumer's individual needs for funds. The banks must therefore anticipate large and unexpected deposit outflows, which require that assets be rapidly sold to finance the deposit outflows. Unlike the government securities and business loans, mortgages do not have short-term maturities, and they do not trade in active and liquid markets. Thus, mortgages create significant liquidity risks for lenders.

HOUSING FINANCE IN TURKEY

Macroeconomic Environment

From the 1960s to the early 1990s, the housing finance system in Turkey was supported mainly by three institutional organizations: Social Security Institutions, Governmental Institutions (the Housing Development Administration [HDA] and the Ministry of Resettlement and Construction) and Commercial Banks. Between 1962 and 1984, the workers' social security fund provided housing loans to its members that allowed for the purchase of over 230,000 housing units. In 1984, the state founded the Housing Development Administration (HDA) in order to meet the housing demand and develop the housing construction sector. The HDA, working through its loan originator banks of Emlak Bank, Pamuk Bank, and Vakıf Bank has funded over 500,000 housing construction loans and over 250,000 long-term housing loans since its creation. Last, commercial banks developed their housing loan programs in the late 1980s as part of their consumer lending activity (Mae, 1992).

The structure of the housing finance market basically has been monopolistic with very few lenders dominating the sector. The workers' social security fund, the leading lender of the market between the 1960s and the mid-1980s, was replaced by the HDA with its three loan originator banks from the mid-1980s to the 1990s. The commercial banks held a very low percentage of housing loans in their asset portfolios. The mortgages offered from the main lenders were all fully amortizing loans with loan-to-value (LTV) ratios that ranged from 20% to 80% at maximum. Although some HDA mortgages had terms of up to 15 years, the commercial banks were unwilling to lend for longer than five years.

In the early 2000s, the market value of housing loans began to grow considerably as a result of a compulsory change in the investment policies of the banks. Until the late 1990s the government was borrowing at high rates and banks were able to earn high income by investing in government bonds. However, as the supply of high-income government bonds dried up, banks moved into housing loans. The market value of housing loans jumped from 39,998 billion TL in 1997 to 673,204 billion TL in 2000 and reached approximately 2,712,631 billion TL at the end of 2004.⁽⁴⁾ This significant increase in housing credits was basically due to the stable economic conditions in Turkey. During the last decade, two state-owned banks (Emlak Bank and Vakıf Bank) have dominated the housing finance market by having 87% to 97.3% of the total housing loans in their portfolios (see Figure 1). These two banks, which have been the main loan originators of the HDA since the mid-1980s, have been the dominant players with their alternative housing loan products in the housing finance market until recently. The HDA lost its monopoly as a housing finance institution because of the decreasing value of its fund under the weight of interest rate subsidies and its mortgage products with very low loan-to-value ratios.

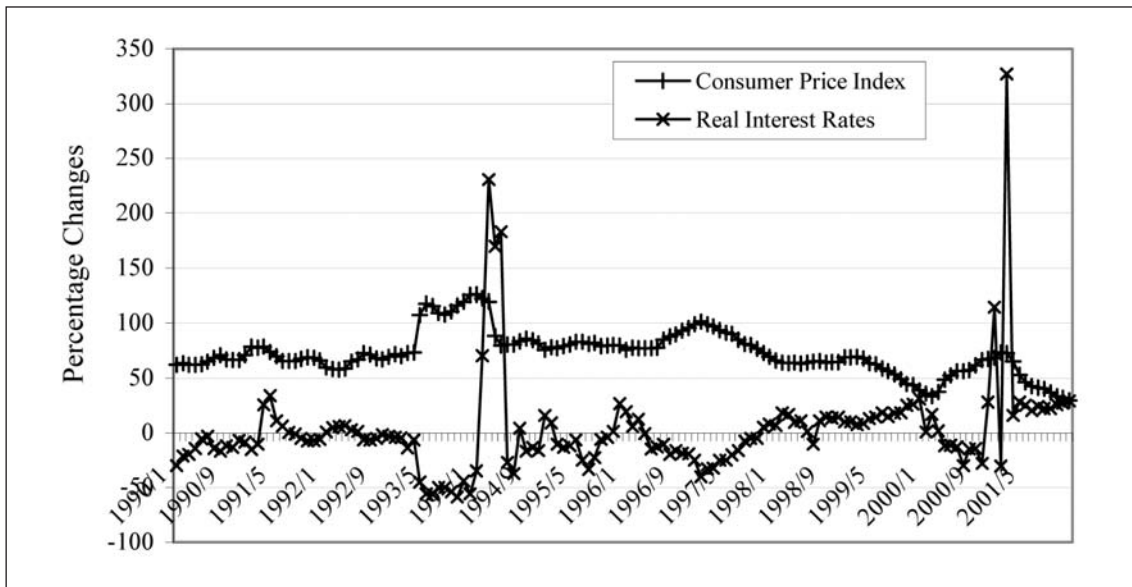
Emlak Bank and Vakıf Bank have worked closely, together with the government, on creating alternative mortgage (long-term, collateralized housing loan) contracts.⁽⁵⁾ However, an efficient mortgage lending system, which provides long-term and affordable mortgage loans to low- and middle-income households, did not exist in the country. Figure 2 shows that housing loans have had a very low percentage of the total consumer loans outstanding in the last eight years. Only recently, in 2000, 2003, and 2004 have they had relatively higher percentages of 12%, 7.8% and 13%, respectively. As stated by Türel (2000), for most moderate-to-middle income households, home ownership in the authorized market has been achieved through self-provision, either purchasing from a builder or an estate agent or acquisition through a cooperative.

The state of development of a country's mortgage market basically depends on the degree of macroeconomic stability. Macroeconomic stability is very important for several reasons. First, it has a major effect on the demand for mortgages. High rates of inflation and nominal interest rates are typical features of volatile economies that reduce the affordability of traditional mortgages of the developed economies. Experience in emerging market economies has highlighted the problems with the traditional fixed rate mortgages (FRMs). Over time, the real value of the loan payment, which is constant in nominal terms, is eroded by persistently high inflation. This decline in the real value of the payment over the term of the loan is known as the *tilt* problem. Since the tilt effect increases as inflation increases, it is clear that higher levels of inflation make it more difficult for households to be qualified for loans based on their current income. Standard adjustable rate mortgages (ARMs) reduce the tilt effect and enable mortgage lenders to manage moderate inflation risk. However, the

ARM contract does not perform well in periods of high inflation by creating major payment shocks for borrowers who suddenly find their monthly payments increasing by more than their incomes.

A volatile economy also affects the supply of funds and the characteristics of mortgages offered by lenders. In a volatile environment, lenders are reluctant to offer long-term loans. This may lead them to not offer mortgages or only offer short-term loans that in turn are less affordable for borrowers.

Figure 1
Annual Market Interest Rate and Inflation (Consumer Price Index) Movements
in Turkey between 1990 and 2002



* Source: Consumer Price Index (CPI) from State Institute of Statistics and Inter-bank Money Market Rate from International Financial Statistics (IFS) prepared by the International Monetary Fund (IMF).

In the last decade, the Turkish economy experienced price movements which have been high and volatile. The two financial shocks in 1994 and 2001 significantly increased the nominal interest rates over the inflation rate (see Figure 1). Under these circumstances, setting the mortgage rate based on market interest rates, as in the case of the FRM and ARM contracts, can create extremely high mortgage payments for borrowers, leading to high rates of mortgage defaults. Thus, the commercial banks did not originate long-or medium-term mortgage loans. The scarcity of funding sources due to the unpredictable inflation rate in the country is the basic impediments for the absence of an efficient mortgage lending system. More specifically, the banks were not willing to lend for long-term housing loans because of the lack of confidence in the economy and the indices used, concern regarding the credit-worthiness of the investment instrument, and the desire for liquidity.

Mortgage Instruments

In emerging economies, the importance of index-linked mortgages in facilitating long-term housing finance has been widely recognized in the existing literature. The Price Level Adjusted Mortgage (PLAM) and Dual Index Mortgage (DIM) contracts have played important roles in facilitating long-

term mortgage lending and borrowing in emerging economies such as Chile, Brazil, Mexico, Ghana, Poland and Colombia. PLAM is designed to keep the real mortgage payments constant over the life of the mortgage. The initial payment is calculated based on the current prevailing real interest rate in the market. The subsequent nominal payments over the life of the mortgage are then calculated each year in line with the rate of inflation. The DIM contract is designed to make the mortgage both affordable for the borrower and profitable for the lender. It amortizes the loan with respect to two independent indices: an index reflecting the change in the borrower's wage and a financial index that reflects the cost of funds.

Another form of indexation is the "indexed unit of account," which was created in Chile in 1967. In 1995, Mexico introduced a price level-adjusting unit of account called the Unidad de Inversion (UDI). The UDI is an amount of currency that is indexed to inflation and is converted to pesos at the time of payment. UDI mortgages are a fixed real rate loan. The loan is repaid inline with the current value of the UDI index and an initial real interest rate, which is fixed over the mortgage maturity. Therefore, the indexation is achieved by quoting prices in a money-like unit rather than relying on an indexation formula as in the case of PLAM and DIM (see Shiller, 1997).

In Turkey, as noted earlier, two state-owned banks have played an important role in residential lending during the last decade. Vakıf Bank has mainly originated dual index mortgage instruments. Emlak Bank originated foreign currency, especially Deutsche Mark, denominated housing loans in the early 1990s. When the Turkish Lira crashed against the Deutsche Mark in 1994's financial crisis, many borrowers defaulted on their loans. Thus, currency risk, which is an un-separable part of foreign currency loans, led to very high credit risk for the lender. Emlak Bank was affected adversely by the 1994 financial crisis and ceased virtually all residential lending activities by 1995. In 1998, Emlak Bank, in cooperation with the government, created index-linked housing loans, which is an alternative mortgage design for the high inflationary environment in Turkey.

Emlak Bank and its index-linked housing loans. Emlak Bank used the traditional mortgage lending system in which one institution performs the major functions of mortgage origination, servicing, funding and portfolio risk management. The bank did not utilize the services of third party vendors such as mortgage insurers, real estate appraisers and credit agencies and accomplished all the primary functions. Thus, Emlak Bank has been a primary mortgage market institution that dominates the housing finance market in Turkey.

Emlak Bank offered loans for the purchase of three types of housing units: those constructed by Emlak Bank, those constructed by the joint venture construction business in which Emlak Bank participated with builders or developers, and those constructed by any builder in the market. Among these three types, dwellings constructed by individual builders in the market were the biggest part of the housing stock of the bank's mortgage portfolio. Emlak Bank's own housing construction projects had 40% of the total housing loans originated and these projects, 18 in number, were developed in the four main cities of Turkey, Istanbul, Ankara, İzmir, and Adana. The market value of loans offered for Emlak bank's own dwellings was 56% of its total housing loan portfolio.

In terms of its loan products, Emlak Bank originated basically two types of housing loans in the late 1990s: Fixed Rate Loans (FRLs) and Index-Linked Housing Loans of Wage-indexed and Consumer Price-indexed. Whilst FRLs were offered as short term loans for all three types of the housing units

mentioned above, the indexed loans were created as new mortgage instruments, especially for the purchase of the bank’s own housing dwellings with 10 to 15-year maturity. The share of indexed loans in the overall residential lending was 31.3% in terms of the number of the loans originated. However, the market value of indexed loans (outstanding mortgage balance) had a higher percentage of 44%. Emlak Bank’s share of this new housing credit was 79%. It is important to note that among the indexed loans, wage-indexed housing loans (WIHLs) were considerably larger percentage, 82%, compared to Consumer Price-indexed loans.

WIHL contract and housing finance policy during the late 1990s inflationary period. Emlak Bank originated a WIHL in 1998 based on one unique index, the Civil Servant’s Wage (CSW) Index. The bank created this specific housing loan for middle-income civil servants, who are the main group of borrowers of housing loans with their state-guaranteed salaries. And the government introduced a policy to link the CSW index to the expected inflation. The aim of this policy was to facilitate housing finance to an important sector of the population, namely middle-income public sector employees.

Table 1
Wage-Indexed Housing Loan Contract

Contract Maturity	120 months
Arrangement fee	0
Prepayment Penalty	no penalty payment
LTV ratio at origination	75%
Index	Civil Servants’ Wage Index
Margin	-
Periodic cap	-
Lifetime caps	-
Reset frequency	semi-annually (6 months)
Initial Coupon Payment	Total Loan / Contract maturity

The WIHL has a ten-year maturity with an initial maximum loan-to-value ratio of 75%. The monthly repayments are indexed to a measure of income in order to maintain the affordability of the loan to the household income. Because the repayments can vary, the loan term also must be variable to accommodate shortfalls in payments when wages are changing rapidly. The contract details are summarized in Table 1. WIHLs differ significantly from the standard mortgage designs by having no contracted amortization rate. This housing credit instrument does not have periodic or lifetime caps that constrain the payment adjustments, and a pre-specified margin to be added to the current value of the CSW index. Also, there is no arrangement fee that is charged to the borrowers at loan origination. The adjustment amount of the outstanding WIHL balance, at a given semi-annual adjustment date, is calculated by multiplying outstanding balance by the Civil Servant’s Wage Rate (CSWR), which is the percentage change in the CSW index. At the beginning of every January and July, the government announces the expected inflation and the Ministry of Finance sets the CSWR in line with the expected inflation over the next six months. That is,

$$CSWR_{t+1} = {}_t\pi_{t+1}^c \quad (1)$$

The actual inflation at a semi-annual date at time t+1, π_{t+1}^a , may be higher or lower than the government's announced expected inflation at time t, that is,

$$\pi_{t+1}^a = {}_t\pi_{t+1}^c + \varepsilon_{t+1} \quad (2)$$

where ε_{t+1} is the unexpected inflation.

$$\text{If } \varepsilon_{t+1} > 0 \quad CSWR_{t+1} < \pi_{t+1}^a \quad (3a)$$

$$\text{If } \varepsilon_{t+1} < 0 \quad CSWR_{t+1} > \pi_{t+1}^a \quad (3b)$$

If actual inflation during the semi-annual period t+1 is higher than the officially expected rate announced at time t for period t+1, the government pays out to civil service employees in cash the difference plus an additional fixed mark-up of 2%. For example, in January 1999 the expected inflation was $\pi_{99/1}^c = 0.3$, the CSW was also 0.3. Since the actual inflation in July 1999 was $\pi_{99/1}^a = 0.35$, the civil service employees received a cash compensation equivalent to an 0.05 increase in their wage, plus an additional fixed mark-up of 0.02 known as a welfare share, in July 1999. This unanticipated positive inflation compensation in July 1999 is for only the semi-annual period between January and July 1999 and it does not affect any future CSWR. Although the government adjusts the civil service employees' wage rate, the mortgage repayment ($MP_{99/2}$) is calculated based on the expected inflation only, which is then fixed for the next six months. Thus,

$$MP_{t+1} = f(CSWR_{t+1}) \quad (4)$$

or

$$MP_{t+1} = f({}_t\pi_{t+1}^c)$$

During the period 1994 and 2004, the House Price Index (HI) and Consumer Price Index (CPI) were highly correlated. Thus, changes in the house price index tracks the movements in the actual inflation. That is,

$$\% \Delta HI = HI_{t+1} - HI_t \cong \pi_{t+1}^a \quad (5)$$

$$\text{If } \varepsilon_{t+1} > 0 \quad HI_t \cong \pi_{t+1}^a > {}_t\pi_{t+1}^c \quad (6a)$$

$$\text{If } \varepsilon_{t+1} < 0 \quad HI_t \cong \pi_{t+1}^a < {}_t\pi_{t+1}^c \quad (6b)$$

Under the circumstances that the six-month cumulative value of actual inflation outpaces the expected inflation, and therefore the CSW index (see Equation 6a), there is no incentive for borrowers to default on their mortgages. This is because, first, their outstanding debt amount is adjusted to the CSW rate, which is lower than the actual inflation rate, and second, the increase in HPI is greater than the CSW rate. However, for the lender the real return is negative when $\pi_{t+1}^a > {}_t\pi_{t+1}^c$. This is precisely what happened in the first half of 2001 when the expected inflation rate ${}_{00/2}\pi_{01/1}^c$, and so the $CSWR_{01/1}$, was set at 15.9%, while the actual inflation rate $\pi_{01/1}^a$ was 32.32%. Conversely, if the actual inflation is lower than the expected inflation rate (see Equation 6b), the lenders realize an

unexpected gain. However, a lower value of π^a increases the borrowers' incentive to default on their mortgages because they bear the burden of a considerably higher amount of mortgage repayment at a time when house price index has declined sharply. This was actually the case in the first half of 2002, when the expected inflation rate ${}_{01/2}\pi_{02/1}^c$, and also $CSWR_{02/1}$, was set as 27.68% while the actual inflation rate $\pi_{02/1}^a$ was 12.09%.

In a typical WIHL contract, the value of each monthly payment is determined in order to allow the principal to be paid in full by the end of the contract term. In the first semi-annual period of the contract, the repayment schedule is a fixed amount, which is calculated by dividing the total loan amount by the mortgage term, and there after at each monthly payment date, the outstanding balance of the borrower's debt decreases by the fixed amount of the calculated monthly payment. From the beginning of the second semi-annual period, the WIHL repayment schedule behaves as an adjusted payment mortgage. The outstanding loan balance is adjusted semi-annually in line with the percentage changes in civil servants' wages. Monthly payments are simply calculated by increasing the remaining loan balance parallel to the publicly announced CSW rate and then dividing the adjusted outstanding balance by the time to maturity (number of months remained). See the Appendix for the mathematical description of the WIHL repayment procedure.

Comparison of Mortgage Instruments under the Economic Environment between 1998 and 2003

The WIHL contract design is similar to that of the PLAM and DIM, which are based on an indexation formula that amortizes the loan balance. However, the WIHL contract does not have either a nominal or real amortization rate. This design has evolved specifically because the interest rate in Turkey has been highly volatile over the last 15 years. During the financial crises in 1994 and 2001 the monthly inter-bank money market rate reached 350% and 400%, respectively. The actual inflation rate peaked at 119% in 1994 and 73% in 2001, which resulted in extremely high real interest rate in these periods. Under these volatile economic conditions, the payment rate or amortization rate (as in the case of ARM and DIM contracts) on the mortgage would have resulted in extremely high mortgage defaults. In Mexico between 1986 and 1995 almost all mortgages were dual indexed mortgages, which were indexed to either the average cost of funds for all Mexican banks or 28-day Mexican Treasury notes. When the interest rate soared during this period, the mortgage defaults reached a record number in 1995 (Lipscomb and Hunt, 1999; and Lea, 1996).

An empirical study by Berument and Malatyali (1999) analyzed the behavior of the Turkish Treasury interest rates based on the Fisher hypothesis. This study uses the sample period from November 1988 to June 1998. In their regression of interest rate on expected and unexpected inflation, Berument and Malatyali found that both coefficients of expected inflation and inflation risk are statistically significant. The empirical findings reveal that while the interest rate is positively related to expected and unexpected inflation, the interest rate increases less than expected inflation. This empirical evidence supports Tobin's (1965) hypothesis that, during periods of high inflation (due to positive unexpected inflation) the real interest rate declines. The observed real interest rate has even become negative in Turkey (see Figure 1).

Under these circumstances, nominal mortgage contracts such as DIM and ARM would have resulted in payment shocks for borrowers leading to default risk, or would have produced negative real return for lenders, leading to real interest rate risk. Mortgages indexed to the expected inflation, such as

WIHL, provide a protection against high mortgage defaults. Lenders also benefit from originating mortgages indexed to the expected inflation, rather than the highly volatile nominal market interest rate, as long as the real interest rate declines in high inflationary conditions. The PLAM and UDI mortgage contracts, which are fixed real rate loans, also insulate both the borrower and lender in real terms from the volatile interest rates. However, these mortgage designs suffer from major payment shocks in that if the inflation rate rises faster than wage rates for any period of time, the payment burdens of the borrowers can become unsustainable, resulting in a high level of defaults.

We now illustrate the costs and benefits of the WIHL contract with reference to the standard mortgage contracts of inflationary environments (PLAM, ARM, and DIM). For each of the mortgage designs starting from 1998, when the WIHL contract was originated, we calculate the amortization schedule

Table 2
Amortization Schemes for Alternative Mortgage Designs

House Price at Origination	20 Billion Turkish Lira (TL)
Loan Amount	15 Billion TL (LTV = 75%)
Real interest Rate at Origination	4.9% \approx 5%
Public sector average earning*	4.74 Billion TL
Private sector average earning	3.71 Billion TL

Wage-Indexed Housing Loan (WIHL) Contract

Year	Outstanding Balance (BillionTL)	CSW Rate		Annual Payment (Billion TL)	Payment-to-Income (Public)
		1 st half	2 nd half		
1998	15.000	0.000	0.349	1.761	0.371
1999	18.206	0.300	0.320	3.050	0.375
2000	27.770	0.200	0.163	4.505	0.396
2001	33.912	0.159	0.212	6.209	0.389
2002	40.818	0.277	0.127	9.238	0.402
2003	48.945	0.100	0.060	11.091	0.412

Price Level-Adjusted Mortgage (PLAM) Contract

Year	Outstanding Balance (BillionTL)	CPI _t / CPI _{t-1}	Annual Payment (Billion TL)	Payment-to-Income (Public)
1999	10.576	0.688/ 0.697	1.488	0.183
2000	9.492	0.390/ 0.688	1.469	0.130
2001	4.817	0.685/ 0.390	0.832	0.052
2002	7.422	0.297/ 0.685	1.462	0.064
2003	2.750	0.184/ 0.297	0.635	0.024

Table 2 (continued)

<i>Adjustable Rate Mortgage (ARM) Contract, margin = 0%</i>						
Year	Outstanding Balance (BillionTL)	Nominal r			Annual Payment (Billion TL)	Payment-to- Income (Public)
1998	15.000	0.746			11.117	2.343
1999	14.988	0.735			11.039	1.356
2000	14.963	0.567			8.629	0.759
2001	14.832	0.919			13.665	0.856
2002	14.789	0.590			9.010	0.392
2003	14.413	0.340			4.685	0.174

<i>Dual Index Mortgage (DIM) Contract</i>						
Year	Outstanding Balance (BillionTL)	r	CPI _t		Annual Payment (Billion TL)	Payment-to- Income (Public)
			1 st	2 nd		
1998	15.000	0.746	0.2953	0.3120	1.549	0.327
1999	26.074	0.735	0.2554	0.3450	2.587	0.318
2000	49.269	0.567	0.1785	0.1801	4.219	0.371
2001	66.081	0.919	0.3232	0.2731	6.257	0.392
2002	106.387	0.590	0.1209	0.1583	9.623	0.419
2003	170.837	0.340	0.1200	0.0570	12.446	0.463

* The average earnings, both for the public and private sectors, are calculated by the State Institute of Statistics for the production and mining industry and electricity, gas, and water related industries. The employees in these industries have relatively higher earnings.

for the first six years of a 10-year mortgage term with a loan balance of 15 billion TL. We exclude the UDI contract because it is not widely used and its indexation is quoted in money-like unit, which differs considerably from the WIHL structure.

Table 2 presents the repayment schedule for each of the four mortgage designs. It can be seen that the outstanding mortgage balance of WIHL and DIM contracts rises over time. The WIHL borrower owes approximately 3.3 times the initial loan amount after six years and the DIM borrower owes 11.4 times the initial loan amount. In contrast, the remaining balance for the ARM contract declines systematically. The remaining balance for the PLAM declines sharply over the same period. As noted above, PLAM contract design uses the inflation rate, generally CPI, to revalue the mortgage balance at the end of each adjustment term. Since the inflation declined rapidly from 99% in 1997 to 18.4% in 2003, the outstanding balance plummets for the PLAM contract. The spike in this outstanding balance scheme in 2002 is due to the jump in inflation from 39% to 685%.

Over the six-year period, nominal annual payments for the WIHL and DIM contracts increase, at an increasing rate, every year. By the sixth year of the WIHL contract, the annual payment is 6.3 times greater than the initial payment in 1998. For the DIM contract, the annual payments begin at 1.55

billion TL and soar to 12.45 billion TL, which is eight times greater than the initial payment. The initial nominal payment for the ARM contract is six to seven times higher than the other contracts. The standard ARM uses the same rate for both the coupon payment and amortization. This rate is normally pegged to the inter-bank deposit rate. In Turkey, the annual interest rate soared to 92% in 2001 financial crisis. Interest rates were also very high in 1998 and 1999, 74.6% and 73.53%, respectively, which resulted in significantly higher initial payments on the ARM contract. For the PLAM contract, nominal annual payment begins at 1.94 billion TL and declines to 635 million TL in 2003. PLAM's outstanding balance declines sharply and makes the annual payments almost negligible over this period.

In order to highlight the relative costs and benefits of these alternative mortgage contracts, we follow Cohn and Fischer (1975). In their article, Cohn and Fischer define the main desirable characteristics of the mortgage instrument from the borrower's standpoint. First, the borrower is able to choose a particular payment-to-income ratio that can vary as desired over the life of the mortgage. Second, the borrower has the ability to budget the mortgage payments in the foreseeable future; therefore, it is desirable if the mortgage payment does not deviate widely from the trend ratio of payments to income. Finally, there is a low level of uncertainty about the real cost of the mortgage or the real rate of interest. Cohn and Fischer argue that the principal criterion to judge alternative mortgage designs is the stability of the payment-to-income (P/I) ratio.

Table 2 presents the P/I ratio for each of the mortgage design over the period 1998 to 2003. For the ARM contract, the high nominal interest rate results in extremely high initial P/I ratio. For the first four years of the contract maturity, the P/I ratio ranges from 0.76 to 2.3. This implies that in high inflation economies the initial payment on the ARM contract is simply unaffordable for the borrower. Moreover, the P/I ratio for the ARM design creates a disparity in payments over the life of the contract, with excessive initial payments and insignificant payments nearer the end. The initial P/I ratio for the PLAM is 0.4. However, due to the continuous decline in inflation (except during the 2001 financial crisis) the PLAM P/I ratio is very low; it ranges between 0.02 and 0.18. Although the PLAM contract seems to be a very safe mortgage instrument for the borrower, there is no incentive for the lender to originate these mortgages because they have negligible repayments. In contrast to the declining inflation, which is observed over the sample period 1998 to 2003, the PLAM contract would have systematically increasing annual payments with persistently increasing inflation. Since the PLAM has a fixed real rate of interest, it is still beneficial for the borrower as stated by Cohn and Fischer (1975). However, when the initial real rate of interest is very high the PLAM becomes unaffordable as is the case for the ARM contract. Besides, during periods when wages lag behind price increases, as in the 1994 and 2001 financial crises, the PLAM would exacerbate the adverse impact upon those borrowers whose income lag behind inflation.

For the WIHL contract, the initial P/I ratio is 0.37, which is noticeably lower than that of the ARM and PLAM designs. Since WIHL repayments are indexed to the civil servants' wage rate, the P/I ratio remains almost unchanged around its initial value. Therefore, the WIHL contract enables the borrower to maintain a stable P/I ratio. Although the initial P/I ratio for the WIHL contract is considerably higher than the generally accepted ceiling of 20 to 28%, Emlak Bank has continued to underwrite these mortgages for two main reasons.⁶⁾ First, during the inflationary periods, house price appreciates more than the rate of inflation. Second, the WIHL contract is specifically designed for an upper-middle income borrower who can draw on other assets in the event of a short fall in mortgage repayment.

The DIM contract has the lowest initial P/I ratio of approximately 0.33. Over the six-year period, the P/I ratio increases to 0.46, which indicates that the DIM contract has a fairly volatile P/I ratio compared to that of the WIHL contract. The first payment of the DIM design is usually set as the percentage of the loan amount (see Chiquer 1998). Lipscomb and Hunt (1999) state that in Mexico, lenders typically originated DIMs with an initial monthly payment of 0.75% of the loan amount. We examine the inflation-indexed DIM design, in which the repayments are indexed to inflation and adjusted every six months. As can be seen in Table 2, the annual payments are insufficient to amortize the principal in the long run. In fact, the short fall in payments becomes very large that the loan can never be repaid over its term. A very high level of interest rate, that is 74.6% to 92%, causes severe underpayment on the DIM contract. By the end of the sixth year, the DIM balance is more than 170 billion TL and the annual payment becomes more than 12 billion TL; since this amortization is practically impossible, the borrower would automatically default. DIMs with payments indexed to the wage would maintain payment affordability, but it can become tremendously costly in terms of the accumulated debt burden.

Table 3
Evaluation of Alternative Mortgage Designs

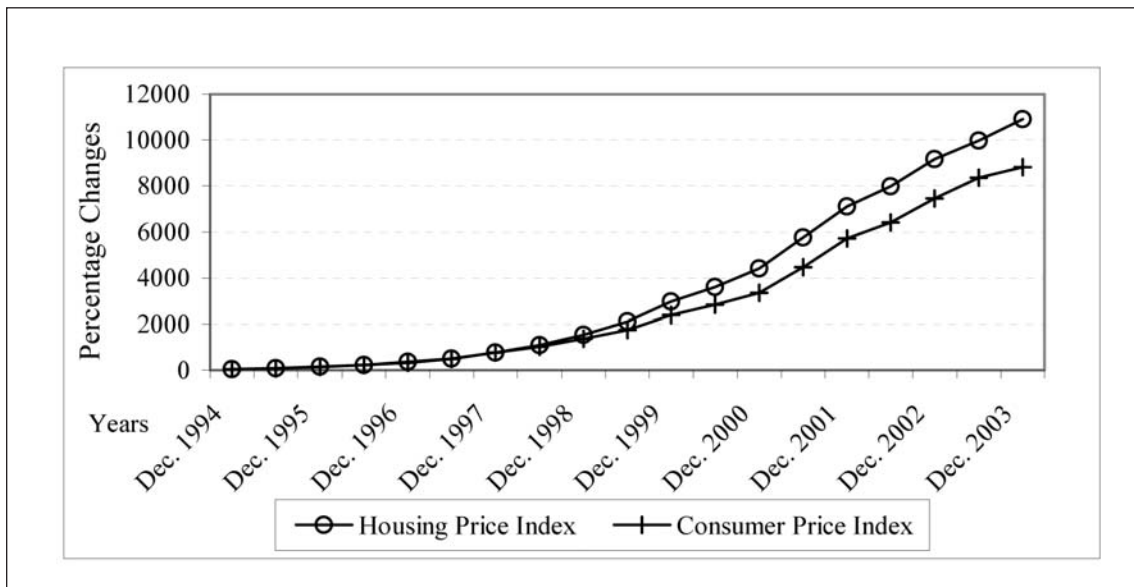
Criteria	WIHL Contract	PLAM Contract	ARM Contract	DIM Contract
Interest Rate Risk	Insulated	Insulated	Risky	Risky
Initial Payment-to- Income Ratio	High	High	Extremely High	Lowest
Volatility of Payment-to- Income	Almost Stable	Volatile	Extremely Volatile	Fairly Volatile

Our comparative analysis of alternative mortgage designs demonstrates that the standard ARM contract does not perform well in a high inflationary environment. Table 3 presents a summary of the mortgage design evaluation. It can be seen that the ARM design is particularly risky with a high interest rate risk and unaffordable initial payments. The DIM contract has a relatively lower or affordable initial P/I ratio, which is moderately volatile over the life of the mortgage. However, as in the case of the ARM design, the DIM contract also has an interest rate risk for the borrower. Due to the high nominal interest rate, both the inflation- and wage-indexed DIM design result in mortgage repayment shortfall or negative amortization which may lead to high mortgage defaults.⁽⁷⁾ The PLAM and WIHL contracts have a clear advantage in that they insulate the borrower from the adverse effect of high interest rates. The WIHL design has an almost stable P/I ratio, whilst the PLAM P/I ratio does vary considerably over the mortgage term.

After examining the payment-to-income ratio, we now discuss the loan-to-value (LTV) ratio of these alternative mortgage contracts. As noted earlier, the LTV ratio is another basic ratio that measures the credit risk (risk of default) on a mortgage loan. For the borrower to exercise his default option the market value of the house must be less than the market value of the mortgage debt. Analyzing the Mexican mortgage market, Lipscomb and Hunt (1999) argue that because house prices often lag behind inflation, the homeowner's equity erodes while the real value of the principal amount remains constant for indexed mortgages. Thus, when analyzing the index-linked mortgages the important question is whether property values move sufficiently in line with the repayment index so as to prevent the erosion of equity.

Figure 2

Cumulative Changes (%) in Housing Price Index (HPI) and Consumer Price Index (CPI) between 1995 and 2003



*Source: State Institute of Statistics, Ankara

In Turkey, there is only a limited availability of information on the expected trends in and volatility of property values, especially at the individual sub-market level. The Housing Price Index (HPI), announced by the State Institute of Statistics, is the only index that incorporates current prices for building materials, labor costs, and land prices and so reflects price changes in the primary market for owner-occupied housing. As seen in Figure 2, the cumulative percentage changes in HPI have considerably outpaced the changes in inflation between 1995 and 2004. Since the house price index appreciated faster than the inflation, the loan-to-value ratios of the WIHL and PLAM contracts are expected to decline continuously even though the unpaid principal have increased systematically for the WIHL design. As seen in Table 2, the outstanding loan balance for the PLAM and ARM contracts are significantly lower than those for the other designs. Since the market value of homeowner's mortgage debt would always be less than the market value of the housing, there is no risk of negative equity. In contrast, the LTV ratio for the DIM contract is expected to be greater than unity, which

clearly results in negative equity for the borrower and consequently high default risk for the lender.

Hence, for the lender, the WIHL contract seems to be an advantageous mortgage instrument in the high inflationary environment in Turkey. The lender benefits from the balloon payment structure of the WIHL contract that results in relatively higher loan-to-value ratios than the standard ARM and PLAM contracts. Since the WIHL repayments are indexed to the borrower's income, the default risk is also low due to the lower payment burden problem for borrowers, especially in the early years of contract maturity. In addition, the WIHL contract does not have a negative amortization risk, as in the case of the DIM contract, which may result in high mortgage defaults. Although the WIHL contract seems to be desirable, it only meets the demands of upper-middle income households, not the requirements of a larger group of borrowers.

Under the stable economic environment of the last few years, where the real interest rate is systematically and moderately positive, we argue that WIHL is not an appropriate mortgage design for lenders. If the stable economic conditions of the recent years can be achieved for a certain period of time, it would certainly be better for the lender to withdraw the inflation-indexed mortgage instruments and adopt the standard mortgage instruments of moderate inflation economies such as FRMs and ARMs.

THE ROLE OF THE PRIMARY MORTGAGE MARKET IN ESTABLISHING A SECONDARY MARKET

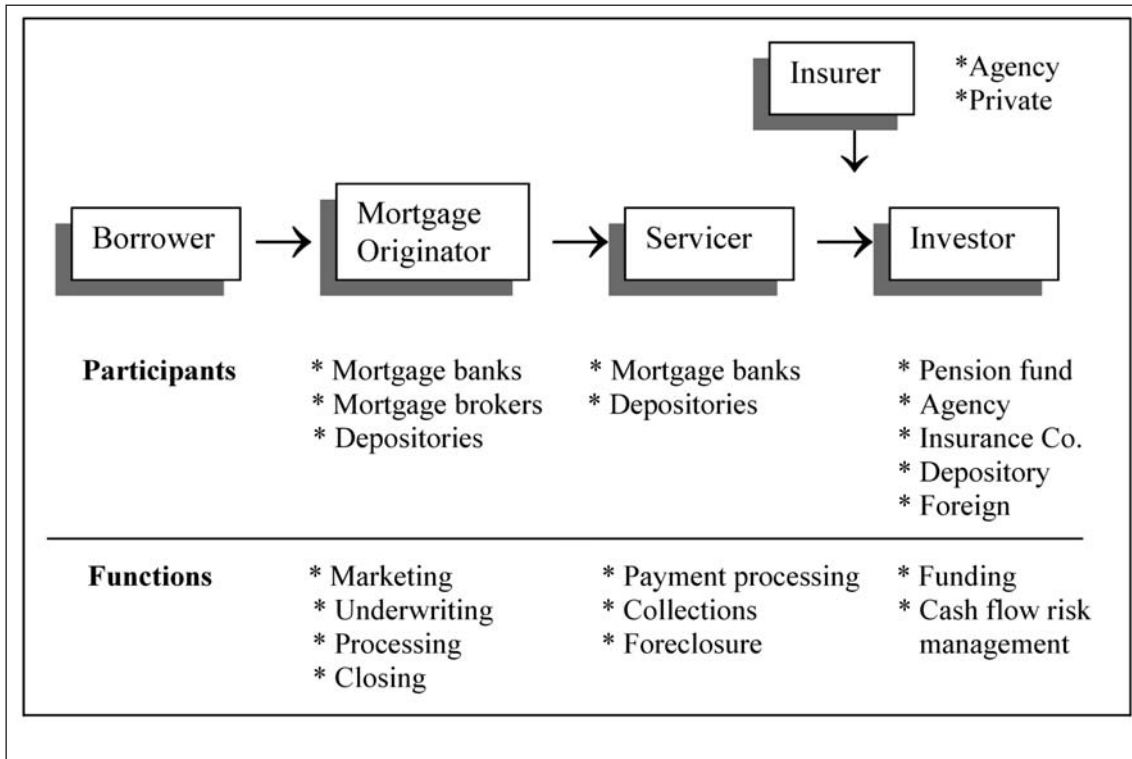
The success of secondary markets for mortgages, particularly in the United States, has inspired developing countries to explore the use of this technique to increase funds available for housing finance and reduce significant housing shortages. Developing countries recognize that a dynamic secondary mortgage market can create a deeper capital market and housing policy that responds to the needs of the private sector.

Figure 3 illustrates the secondary mortgage market (SMM) system, in which the functions of mortgage origination, servicing, risk-management and funding are managed by different specialized entities. Loan originators may be traditional depositories, mortgage companies or mortgage brokers. The institution that originates the loan may or may not be the one that services it. In the SMM structure, there are a wide variety of investors ranging from depositories (investing in loans originated and serviced by others) to mutual funds. In the global market they may be either domestic or foreign. The credit risk management is often specialized and provided by third parties such as mortgage insurance companies (see Lea, 2000).

The SMM is dominated by large institutions that specialize in either purchasing mortgages or in lending funds to the institutions that hold the mortgages.⁽⁸⁾ In the SMM system it is difficult to hide the mistakes because of the dependence of one institution on another. In contrast, in the primary mortgage system, a loan that is mispriced or has incomplete documentation can be hidden in the portfolio of the lending institution. If a loan is mispriced, the lender has an immediate loss. Even if the loan is properly priced, incomplete or erroneous documentation can make it necessary for the lender to repurchase that loan at a future date. Thus the quality of mortgages produced by the primary market becomes much more important in the SMM system.

Figure 3

Secondary Mortgage Market (SMM) System (Modern Mortgage Lending)



A well-functioning SMM eliminates the constraints that hinder the development of housing finance systems in emerging economies. Secondary markets have two main benefits. First, banks can remove the risks associated with holding mortgages by selling the loans to other investors through the secondary market. Second, secondary markets create standards for credit evaluation and collateral procedures that directly increase the efficiency of the primary markets for new mortgage originations.

There are several primary mortgage market prerequisites for the development of a secondary market. First, an active primary market should exist for the establishment of a secondary mortgage market. The primary mortgage market must be at a sufficient stage of development to produce a significant volume of loans to develop the secondary market infrastructure. The structure of primary market is another key factor in SMM development. The degree of competition in the primary market, which is determined by government policies, may have a major bearing on the readiness of lenders to participate in a secondary market. In a monopolistic market structure, the leading mortgage lenders usually are supported by financial and regulatory government incentives. They often prefer to offer mortgage rates less than those necessary to provide acceptable risk adjusted returns for investors. However, for the SMM development, mortgage rates must provide a return that is attractive relative to their alternative investment opportunities. The more competitive the mortgage market, the greater the potential for secondary market development. Third, the macroeconomic stability should be achieved in order to increase both the demand for mortgages and the supply of funds to housing finance sector. For the lender, mortgage instruments must be attractive investments. The cash flow from mortgages must be predictable so that investors can price and evaluate the risk of their investments.

Reliable and consistent loan underwriting is another important condition for SMM development. Investors must have confidence that lenders are properly underwriting the mortgage loans and judging the risk. As described by Lea (2000), all mortgage underwriting, whether traditional or modern, is based on three main factors: collateral, credit reputation and capacity. Each mortgage is backed by real property as collateral. An accurate assessment of the value of the collateral (an accurate appraisal) is fundamental to determining if the lender could cover losses from the sale of the house in the event of borrower default. A credit reporting system is also crucial for lenders to be able to track a borrower's history of repaying the debt and whether payment is up-to-date or delinquent. The borrower's financial capacity to repay the mortgage is the third important underwriting factor. The lender should evaluate the default (credit) risk of the borrower by calculating the mortgage debt-to-borrower's income ratio.

Lastly, the standardization of the mortgage instrument is necessary for the development of the SMM system. The characteristics of the mortgages (e.g., amortization schedule, mortgage term, rate adjustment) should be uniform in order to facilitate larger pool size for securitization and obtain more liquidity for the sale of mortgage loans.

Development of a Secondary Mortgage Market (SMM) in Turkey

In Turkey, a well-organized and sufficiently deep primary mortgage market has not existed until recently. The government-subsidized HDA and two state-owned banks have expanded to fill the void left by the commercial banks in the mortgage sector and created alternative instruments such as long-term dual index mortgages, inflation- and wage-indexed mortgages, and short-term fixed rate housing loans. As noted earlier, the absence of an efficient primary mortgage market was due to the highly volatile inflationary environment and the monopolistic structure of the housing finance sector. In the last three years, however, inflation dropped to the lowest levels of the past 16 years. Obviously, the stable economic environment could provide incentives for commercial banks and private investors to invest in long-term mortgages. Under the conditions that steady state of the economy persists for a certain period of time, the standard mortgage contracts of moderate inflationary environments, such as the fixed- and adjustable-rate mortgages can be safely originated for the long-term. It is essential that the banks should originate similar types of mortgage products in significant amounts in order to create an active primary mortgage market. Mortgage contract designs, particularly the market indices that will determine the periodic mortgage repayments, should be selected carefully.

In Turkey, the banks predominantly used non-pricing rationing in underwriting their housing loans, using, for example, the basis of borrower's income and employment proof and credit history to allocate their loans. Instead of just relying on the credit worthiness of the borrowers, lenders should develop methodologies for credit risk management and use these methods in identifying the common features of borrowers and properties with delinquent loans. In this way, lenders can frequently adjust their underwriting standards that are based upon actual loan performance and best reflect the risk factors for borrowers. For Emlak Bank, underwriting standards for the mortgage loans was basically designed for upper middle income or higher income borrowers with greater assets to draw upon in the event of a short fall in mortgage repayment. The underwriting standards should be available to a larger group of borrowers by taking into consideration the mortgage debt-to-borrower's income ratio.

For property underwriting issues, most banks use internal staff such as architects or engineers to determine the collateral (real property) value. Occasionally, the banks may turn to outside help, such as Emlak Bank, which charges 1% of the mortgage loan amount for this service. Over the last few years, the Appraisal Institute in the United States has established coordinated education programs in Turkey and other developing countries, including South Africa and Korea. The main focus of the program is training independent experts that can value real estate collateral adequately and protect risks. In terms of the legal framework, there is a well-established property registration process. There is also a well-developed credit reporting system, in which the banks provide the Central Bank with names and data on delinquent borrowers. Therefore, all banks can obtain this information on defaulted borrowers from the central bank.

After creating a well-organized and active primary market, it is necessary to establish a secondary market for the mortgages. The Turkish government should play an active role in the earlier stages of the SMM development, as was the case in developed economies. Particularly, the government should help to create a kind of mortgage credit institution (MCI) that will purchase mortgages from the originators.⁽⁹⁾ Assuming that the funding source of the MCI would be bonds of various maturities issued in the capital markets, this institution must have a high enough credit rating to issue bonds. Since it is difficult for private market institutions to cooperate in order to cover the large initial costs to set up such an institution, the government must be active in creating mortgage loan institutions.

Jaffee and Renaud (1997) examine some specific principles that can guide a government toward providing efficient support for the SMM development. We might assume that the SMM takes the form of a MCI, which issues debt in the capital market and uses its funds to purchase mortgages from the private market institutions that originate them. In the initial stages of the SMM development, the government should share ownership with private market participants and contribute to the MCI's equity capital. Another primary role of the government is to guarantee the bonds issued by the MCI. Furthermore, the government should maintain a supervisory role reflecting its stake in the guarantees it provides on mortgages and the institutions operating in the SMM. The government should also set standards for the entire mortgage market. In particular, it should set regulations specifying the type of mortgage assets purchased and bond liabilities issued by the MCI.

Since the ultimate aim is to create an effective housing finance system in Turkey, not to support any specific group of lenders and borrowers, access to the SMM should be available to all lenders and borrowers who are able to offer properly underwritten mortgage instruments for sale. In this way, without the need for any central power, the private sector institutions that are originating efficiently mortgages and using the SMM system would be encouraged to do so. As the housing finance system develops, the MCI is likely to become profitable. In order to prevent the monopolistic power of a single MCI, there should be additional entries for competitive MCIs.

CONCLUSION

In 1998, the Turkish government, in collaboration with a state-owned bank (Emlak Bank) created a special wage-indexed housing loan (WIHL) in order to finance housing for middle-income civil servants. The success and usefulness of the WIHL instrument depends not only on the contract design itself, but also on the correct set of supporting actions and policies by the government. Emlak Bank created the WIHL as a specific contract design for middle-income public employees, who are the

main group of borrowers of housing loans with their state guaranteed salaries, and the government introduced a policy target to keep the movements in the wage index in line with the expected inflation. This study concludes that, during periods of high inflation, the WIHL contract was a desirable housing loan from the perspective of both borrower and lender by providing insulation against highly volatile interest rates. However, Emlak Bank went bankrupt in the 2001 financial crisis. The bank ceased all of its residential lending activities and transferred all the existing housing credit accounts to another state-owned bank (Ziraat Bank).

Turkey has entered an entirely different economic environment during the last few years. Under the stable economic conditions of the recent years, alternative housing finance systems can be adopted from developed economies. We believe that it is necessary to establish a secondary mortgage market (SMM) in order to increase funds for housing finance. A successful secondary market can be developed if there is a sufficient volume of well-documented and underwritten mortgage loans that are serviced by professional organizations. We argue that the Turkish government has a crucial role in establishing the SMM system in the near future. The government must create an economic and legal infrastructure that can support the long-term, collateralized mortgage lending and encourage the private sector participants in order to establish a successful housing financial system in the country.

During the last year, the banking sector has expanded the mortgage loan products significantly. Currently, commercial banks are originating long-term mortgages (20 to 25-year contracts) at a 1.3% to 1.35% interest rate. The banks are rapidly constructing their mortgage portfolios, which is an important step for creating a secondary mortgage market in the country. Furthermore, newly developing personal pension (retirement) system, which may specialize in purchasing mortgages from the commercial banks, is another progression towards the establishment of a secondary mortgage market. Nevertheless, commercial banks, which aim to hold high percentages of mortgage loans in their asset portfolios, may face high interest rate risks if the existing stable conditions in the economy cannot be achieved in the future.

NOTES

1. According to Deng et al. (2000), the outstanding volume of residential mortgages was over \$3 trillion in 2000 while the stock of outstanding US government debt was about \$5 trillion, and almost half of the stock of mortgages is held in mortgage-backed securities. Ambrose et al. (2002) state that the outstanding volume of securitized mortgage debt is \$3.7 trillion as of the second quarter of 2001.
2. Thrifts refer to savings and loans formerly insured by the Federal Savings and Loan Insurance Corporation (now insured by the Federal Deposit Insurance Corporation [FDIC]) and savings banks insured by the FDIC. Both institutions have focused on retail deposit gathering and mortgage lending.
3. In developed economies, the ratio of borrower's annual income to housing property value is 1/4 or 1/3; however, in transition economies it is 1/10 or lower (Jaffee and Renaud [1997]). In Turkey, the ratio of civil servants' annual income to the house price is between 1/5 and 1/6. Erbaş and Nothaft (2002) also calculated the average income to house price ratio as 1/5 for Turkey.

4. The real market value of the mortgage loans jumped from 46.6 billion TL in 1997 to approximately 280.7 billion TL in December 2004. These figures are real market values calculated as nominal mortgage loan values denominated in consumer price index number (1994=100 index) of the corresponding month (December) of each year. The market value of the mortgage loans that are denominated in US Dollars (\$) jumped from \$195 million in 1997 to \$2.03 billion in December 2004.
5. The term “mortgage” can be used for the housing loans that were originated by the HAD’s loan originator banks, of Emlak Bank, Pamuk Bank, and Vakıf Bank. Unlike the short-term loans originated by commercial banks, these mortgages were long-term and collateralized housing loans.
6. McCulloch (1986) states that for the PLAM contract the lenders generally imposed a ceiling of 20% on the initial ratio of the loan payment to the borrower’s income. As inflation appeared to become more reliable, lenders increased this limit to 25% then to 28% and sometimes even higher. For the ARMs, the commonly used ceiling on the initial P/I ratio is 28%.
7. It is important to note that over the period we used in this study, the real rate of interest was considerably high. During periods when the real interest rate is negative, as between 1987 and 1997, the ARM is still very risky for the borrower because the interest rate ranges from 40% to 76% and would result in unaffordable initial payments. For the DIM contract, there is still a risk of negative amortization due to high enough interest rates. On the other hand, extremely high inflation rates, which result in negative real rates of interest, will lead to unaffordable payments for the inflation-indexed DIM borrower.
8. Investing in mortgages exposes the investor to default and prepayment risk. An alternative way for the investors is to invest in mortgage-backed securities. This is a security created when one or more holders of mortgages form a pool of mortgages and sell shares or participation certificates in the pool. When a mortgage is included in a pool of mortgages that is used as collateral for a mortgage backed security; that is the mortgage is securitized. The cash flows of a mortgage-backed security depend on the cash flows of the underlying mortgages.
9. Mortgage credit institutes have been created throughout Europe as mortgage loan banks.

REFERENCES

- Ambrose, B.W., LaCour, M. and Sanders, A.B. (2002). “Credit Spreads: Evidence from the Mortgage Market.” Unpublished paper.
- Berument, H. and Malatyali K. (1999). “Determinants of Interest Rates in Turkey.” Discussion Paper: 9902, The Central Bank of the Republic of Turkey.
- Chiquier, L. (1998). “Dual Index Mortgages (DIMs): Conditions of Sustainable Development in Poland,” East European Regional Urban Sector Assistance Project, The Urban Institute.

Cohn, R.A. and Fischer, S. (1975). "Alternative Mortgage Designs," in F. Modigliani and Lessard (eds.), *New Mortgage Designs for Stable Housing in an Inflationary Environment*. Federal Reserve Bank of Boston Conference Series.

Deng, Y., Quigley, J.M. and Van Order, R. (2000). "Mortgage Terminations, Heterogeneity and the Exercise of Mortgage Options," *Econometrica*, 68(2): 275-307.

Diamond, D.B. and Lea, M.J. (1992a). "Chapter 6: United States," *Journal of Housing Research*, Special Issue: Housing Finance in Developed Countries, 3(1): 145-170.

----- (1992b). "Chapter 5: United Kingdom," *Journal of Housing Research*, Special Issue: Housing Finance in Developed Countries, 3(1): 115-144.

Erbaş, N.S. and Nofthaft, F.E. (2002). "The Role of Affordable Mortgages in Improving Living Standards and Stimulating Growth: A Survey of Selected MENA Countries." IMF Working Paper, Middle Eastern Department.

Fannie M. (1992). "Creating a Market Oriented Housing Finance System in Turkey." Fannie Mae International Housing Finance Team, Washington, United States.

Fabozzi, F.J. and Modigliani, F. (1992). *Mortgage and Mortgage-Backed Securities Markets*. Boston: Harvard University Business School.

Geltner, D. and Miller, N.G. (2001). *Commercial Real Estate Analysis and Investments*. (Chapter 16). Ohio: South-Western Publishing

Jaffee, D.M. and Renaud, B. (1997). "Strategies to Develop Mortgage Markets in Transition Economies," in J. Doukas, V. Murinde and C. Wihlborg (eds.), *Financial Sector Reform and Privatization in Transition Economies*.

Lea, M.J. (1996). "Restarting Housing Finance in Mexico." Paper presented at the US/Mexico Global Forum.

----- (2000). "The Role of Primary Mortgage Market in the Development of a Successful Secondary Mortgage Market." Infrastructure and Financial Markets Division Papers.

Lipscomb, J.B., and Hunt, H. (1999). "Mexican Mortgages: Structure and Default Incentives, Historical Simulation, 1982 to 1998," *Journal of Housing Research*, 10(2): 235- 65.

Manchester, J. (1985). "Evidence on Possible Default under Three Mortgage Contracts," *Housing Finance Review*, 4(1): 517-36.

McCulloch, J.H. (1986). "Risk Characteristics and Underwriting Standards for Price Level Adjusted Mortgages versus Other Mortgage Instruments," *Housing Finance Review*, 5: 65-97.

Shiller, R.J. (1997). “Indexed Units of Account: Theory and Assessment of Historical Experience.” Paper presented at the International Conference of the Central Bank of Chile.

Tobin, J. (1965). “Money and Economic Growth,” *Econometrica*, 33: 671-684.

Türel, A. (2000). “Limits of Home Ownership in Turkey.” Paper presented at the ENHR Conference in Gavle.

APPENDIX

For a typical wage-indexed housing loan (WIHL), in the first semi-annual period, the monthly payment (MP) is a fixed amount, which is calculated by dividing the total loan amount (L) by the mortgage term (n), and there after on each monthly payment date, the outstanding balance (OB) of the borrower’s debt decreases by the fixed amount of MP.

$$MP(i) = \frac{L}{n} \quad \text{where } n=120 \text{ months} \quad (A1)$$

$$OB(i, j) = [L - (MP(i) * j)] \quad \text{for } i = 1, j = 0, \dots, 6 \quad (A2)$$

i = the ith adjustment period for mortgage payment; the total number of adjustment periods = 120 months / reset frequency. Thus, i = 1, 2, ..., 20 periods.

j = the jth monthly payment date in the ith adjustment period, where $0 \leq j \leq 6$

From the beginning of the second semi-annual period, the monthly repayment schedule behaves as an adjusted payment mortgage, and the outstanding balance is adjusted semi-annually in line with changes in the CSW rate. Monthly payments are calculated as

$$MP(i) = \left[OB(i, 0) * \frac{(1 + CSW_{(i,0)})}{\eta_i} \right] \quad \text{for } i = 2, 3, \dots, 20 \quad (A3)$$

where η_i = the number of remaining months from adjustment period’s beginning to the contract maturity. Thus, $OB(i,0)*(1+CSW_{(i,0)})$ is the CSW rate-adjusted outstanding balance that determines the monthly payments with time to maturity parameter η_i . The outstanding debt amount after the payment date t(i,j) is

$$OB(i, j) = [OB(i, 0)(1 + CSW_{(i,0)})] - (MP(i) * j) \quad (A4)$$