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**TURKEY  
CUSHIONING ADJUSTMENT COSTS: THE  
USE OF DEBT OR SUBSIDIES FOR HOUSING**

**APPENDICES**

**January 6, 1989**

**A report prepared for the Government of Turkey by USAID  
and The World Bank with the assistance of  
The Urban Institute**

**U.I. Project 3851**

**Opinions expressed in this document are those of the author(s) and do not necessarily represent the views of The Urban Institute or its sponsors.**

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APPENDIX I

T.C.  
BAŞBAKANLIK  
HAZINE VE DİŞ TİCARET MUSTEŞARLIĞI

23 JUN 1988

Sayı : DEİ-IV-3-A

Konu :

50049

Mr. Yoshiaki ABE  
Division Chief  
Infrastructure Operations  
EMENA, CDI  
The World Bank

Ref: Your letter dated May 23, 1988 concerning the development options of the Mass Housing Fund.

Dear Mr. Abe,

As mentioned in your above referred letter, since 1984 the Mass Housing Fund has been successful in its efforts of solving the housing finance problem which has been a serious concern for the Government.

However, as indicated by the MHF Management to Mr. R. Buckley and reflected in his aide-memoire, on this stage the MHF needs to reorganize itself by establishing a more effective body to continue its supporting efforts for housing sector in a more efficient way.

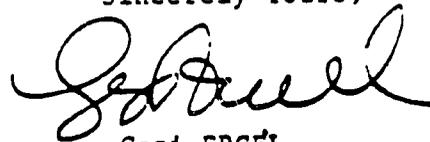
It has been understood that the MHF would need a detailed study prior to the restructuring works to identify its existing position in the sector and what can be proposed for a more effective management. If the proposed study may be extended to the sectoral level it would be more valuable for us.

For this purpose, we would like to seek the possibility of World Bank assistance to support or to carry out the required study.

We would appreciate if you send a mission in the near future to discuss with MHF management, the Treasury and other related parties to clarify what can be done for a comprehensive study on this subject.

We look forward to receiving your early response.

Sincerely Yours,



Gazi ERÇEL

General Director for External Economic  
Affairs of the Undersecretariat of the  
Ministry of Treasury and Foreign Trade

## Appendix II

### THE INFORMAL HOUSING SECTOR IN GECEKONDU AREAS

In order to put the gecekondu housing situation in some perspective, certain changes over approximately the past thirty years in the informal housing sector in gecekondu areas are discussed. This description is based largely on a composite of discussions about the practice because there is not a great deal of statistical information on an informal housing sector. We define this sector, as did Dubin (1986), to include homes built by squatters, those built on titled land without construction or occupancy permits, and neighborhoods in which there is a predominance of either of the prior two characteristics.<sup>1</sup>

The earliest gecekondu settlers of the late 1940s and 1950s were low-income relatively small nuclear families of rural origin. Through networks of friends or relatives they would find a lot that had no prior claimant on which to squat, typically located on public land on the periphery of a city. Since a court order was required for the government to demolish an inhabited building, the goal was to get the house completed at night or overnight (hence the name gecekondu, which literally means "put up overnight") and move in before the authorities took note of it. This was typically done by engaging a local petty contractor contacted through one's social network of relatives, friends and neighbors. Construction supplies would be purchased locally and the contractor and some friends or relatives would put up the structure, often overnight. Costs of labor and materials were kept to a minimum by

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<sup>1</sup> Alan Dubin "Housing Finance Case Studies, Cukurova." Urban Development Report, 1986.

the mutual-aid system of labor supply and by obtaining materials on credit or by partially getting them from one's village in advance of the construction. The structure was then improved incrementally as resources permitted. In this early period the plentiful supply of land and housing combined with the informal and often partially non-monetary means of construction kept costs at a minimum. What cash that was needed was usually generated from family wealth or by small loans from family or neighbors.

During the 1960s and particularly after the Gecekondu Law of 1966 it became clear that the government was not as hostile to gecekondu construction as it had been in the past, and less likely to demolish such homes. There was, as a result, less pressure to build at night, and as a result buildings of a higher standard could be constructed. Locally-organized teams of laborers assisting the owner continued to do the building. Materials were more frequently obtained by local suppliers that had sprung up in the gecekondu areas. Many of these suppliers began to provide easy credit or loans to those who were building. These transactions were almost always carried out on the basis of personal contracts between people who were from the same region or of the same sect or ethnic group or the like.

By the 1970s the situation had begun to change. With the population increase in cities, the movement of middle-income housing sites to the periphery of the city and inflation in general, real estate values began to rise rapidly. Developers and real estate brokers began to operate in these areas leading to considerable land speculation and profits. Typically a real estate broker would buy a tract of land on

the outskirts of the city and subdivide it into small unserviced plots which were then sold to those interested in building. Indeed, 80 percent of the units surveyed in the Cukurova study were purchased from real estate agents. Only 20 percent were squatters.

The boundaries of these properties were based upon an agreement between the broker and the purchaser. Under such circumstances it was not possible to get a building permit. The home constructed was, therefore, illegal. Usually labor would be recruited through the local suppliers. However, inflation had begun to lead to increasing costs of these in addition to the cost of the purchase of the land. The result of this was a greater dependence on family wealth, possible selling off village land, and an increasing reliance on loans. It became especially difficult for a low-income family to build its own home under such circumstances. The Cukurova study, for example, indicates that on average, it took seven years to accumulate sufficient resources to buy the land and another four years to pay it off and gather sufficient resources to begin construction on it.

Those who had built single-story typical gecekondü structures on their own land at an earlier time began to tear them down and construct four or five story apartment buildings in their place. According to the Cukurova study, the Istanbul experience suggests little mobility away from the original neighborhood. This conversion and vertical upgrading most commonly took place in gecekondü areas close to the center of the city where land values had rapidly appreciated. The buildings would be built via an arrangement with a contractor that would allow the landowners to maximize his initial small investment without investing

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any further cash in the construction. Usually a 50/50 deal was arranged whereby the landowner would put up the land and a contractor would be responsible for the construction. Rarely are homeowners also the builders.

Construction costs and quality were usually kept to a minimum, and the provision of infrastructure and other services only supplied at a bare minimal level. Such buildings were typically constructed without permits (or even plans) and are the basis for the semi-modern but uniquely underdeveloped look of large parts of Turkish cities since the 1970s.

#### Selected Characteristics of Gecekondu Housing

The average monthly income of the Cukurova survey was 102,500 TL per month. This is considerably higher than the figure in the Gecekondu Upgrading Survey G.U.S. undertaken by the GOT. The figure in that survey was 70,000 TL per month. The explanation may lie in the fact that the Cukurova survey was of new units whereas the G.U.S. was for existing units. In either case, the income level is high according to standard measures of the urban income distribution. See, for example, Table 3.3 in the text.

The average household size is 6.4; almost 20 percent larger than the urban average. However, the average house size, 93 square meters, is also considerably larger than the average house in the existing housing stock, see Table 3.10 in the text.

Appendix III

**THE LEVELS AND COMPOSITION OF HOUSING CONSTRUCTION**

Due to large discrepancies in data, it is difficult to derive estimates of the total housing production in Turkey. For example, if building permits are used, government estimates show formal sector housing production gradually increasing from 155,000 units in 1970 to 253,000 in 1980 (or a total for the period of almost one million units). However, if occupancy permits are used as an indicator, formal sector housing production was significantly lower, increasing from 72,000 units in 1970 to 124,000 units in 1979 (or total for the period of nearly 1.0 million units). See Table III.1.

Table III.1  
Housing Production in the Formal Sector, 1975-86

Period	Total Production	Annual Growth Rate	Private Sector	Pct	Cooperatives	Pct	Public Sector	Pct
1970	71,589							
1971	72,812	1.7%						
1972	88,231	21.2%						
1973	96,163	9.0%						
1974	84,199	-12.4%						
1975	97,431	15.7%	88,662	91	7,892	8	877	1
1976	102,110	4.8%	92,024	90	9,166	9	920	1
1977	119,409	16.9%	107,065	90	10,917	9	1,427	1
1978	120,615	1.0%	107,194	89	12,148	10	1,273	1
1979	124,297	3.1%	108,484	87	13,978	11	1,835	1
1980	139,207	12.0%	123,789	89	12,056	9	3,362	2
1981	118,778	-14.7%	102,648	86	12,874	11	3,256	3
1982	115,986	-2.4%	94,303	81	15,826	14	5,857	5
1983	113,453	-2.2%	90,528	80	17,201	15	5,724	5
1984	122,580	8.0%	97,709	80	19,456	16	5,415	4
1985	118,205	-3.6%	93,675	79	21,273	18	3,257	3
1986	168,597	42.6%	128,140	76	34,311	20	6,146	4
1987	194,239	15.2%						
1970-79	976,856	6.8%						
1975-79	563,862	8.3%	503,429	89	54,101	10	6,332	1
1980-84	610,004	0.2%	508,977	83	77,413	13	23,614	4
1985-86	286,802	19.5%	221,815	46	55,584	12	9,403	2
1985-87	481,041	18.1%						

Source: State Planning Organization

Demographic data are also at variance with official housing production estimates. During the 1970s, the urban population grew from 12.8 million to 20.5 million or by 7.7 million (of which one-tenth was due to reclassification of settlements) and the average size of urban households declined from 5.4 in 1970 to 4.9 in 1980. If population growth and average household size are taken as an indicator of new family formation, these figures suggest that dwellings were built for about 1.5 million new urban households between 1970-80. Including replacements (estimated at about 30,000 per year), actual housing production in urban areas could have been as high as 1.8 million units. If occupancy permits are taken as a criterion of formal sector housing production, these estimates suggest that the informal sector accounted for about 900,000 dwelling units or 50 percent of the total, thus confirming the informal sector's important role in housing delivery.

Since 1970, the number of building permits issued per year ranged from a low of 144,000 in 1981 to 252,000 in 1979. Over 1973-77, the average numbers of permits per year was 176,000 and from 1978 to 1983, 195,000. While increased population growth would lead to a gradual increase in housing required over time, the sudden doubling of permits issued per year in 1986 and 1987 indicates accelerated production. It is reasonable to assume that much of the sudden increase results from the availability of highly subsidized MHF credit, and would not have occurred in its absence. Even assuming that 200,000 permits per year would be considered "normal", the 500,000 units remaining are likely to be units begun in the expectation of receiving MHF credit. Much of such

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housing may have been undertaken as an investment rather than required for the shelter of the owner.

Rising building costs combined with increased demand for MHF credit has led to a drop in the percentage of total construction costs that can be funded through the MHF. While the total number of residential units under construction has increased substantially, as evidenced by the rise in building permits, it is doubtful that these units will be completed without considerable delay.

TABLE III.2  
Average Annual Building Permits Issued

<u>Period</u>	<u>Number of Permits (000)</u>
1973-77	196.0
1978-83	195.0
1984	189.0
1985	159.0
1986	392.0
1987	488.0

MHF Funded Units in Relation to Total Housing Construction

While it is difficult to measure the proportion of total units financed by MHF precisely, some estimates can be obtained by comparing building and occupancy permit data with MHF information. Over the 1984-87 period, 31 percent of completed "formal" units utilized credit available from the MHF. This percentage dropped from a high of 50 percent in 1986 to 25 percent in 1987 and is expected to drop further in 1988. Thus, occupancy permits may not truly reflect the number of completed units. Recently it has become routine in some areas for owners to delay applying for occupancy permits to postpone the start of credit repayment.

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The total number of units receiving MHF credit disbursements is approximately 46 percent of all units receiving building permits during the same period. This rate may be high as some units receiving disbursements in the early years of MHF have been under construction with building permits issued in earlier years. If we assume all these co-ops had building permits issued before 1984, MHF funded units would comprise only 31 percent of all units under construction, as was the case with occupancy permits. These two approaches suggest that at most 46 percent of all housing received MHF credits, and more likely about 30 percent were funded by the MHF.

#### Completion Rates

A brief look at the historical level of completions in the housing sector before and after the establishment of the MHF is helpful to measure its success in stimulating level housing completion. The ratio of occupancy permits to building permits issued over the same period is an approximation of the percentage of complete units or the completion rate. Dividing the years 1973 to 1987 into three different periods reveals that the completion rate has fluctuated, but fallen over the last three years. The falling rate of completion is further evidence of the false hopes generated by the availability of subsidized MHF credit. This is shown in Table III.3.

Table III.3  
Completion Rates from 1973 to 1984

Period	Building Permits Issued (000)	Occupancy Permits Issues (000)	Completion Rate (%)
1973-77	978.3	499.2	51.0
1978-83	1116.0	734.0	65.8
1984-87	1129.0	604.0	53.5

Source: State Institute of Statistics

Many co-ops had been organized and possibly begun construction prior to formation of MHF. They represent the oldest segment of the MHF market. As would be expected, the rate of completion is higher than for the newer projects receiving MHF credit. In spite of the high rate of completion, 66 percent for old co-ops, the average completion rate on all MHF funded units to date is 41 percent, even less than the completion rate for the housing sector as a whole. These results, shown in Table III.4, are further evidence that the availability of subsidized credit has stimulated housing construction in general, but has not succeeded in shortening the construction period. The prolonged period further serves to raise the total cost of housing both through increases in the real costs of building materials and through accumulating interest during the construction period.

Table III.4  
MHF Units Completed and Completion Dates

	<u>Total Units Receiving MHF Credit from 1984-88</u>	<u>Total MHF Units Finished (000)</u>	<u>Completion Rate (%)</u>
Old Co-ops	187.6	123.2	65.7
New Projects	411.5	124.6	30.0
Total	599.1	247.8	41.4

Despite the MHF regulation limiting the construction period to 33 months there is little evidence indicating a reduction in the time to complete housing units. In fact, the long period of construction is directly correlated with the time required to mobilize financial resources to carry out construction. The higher the percentage of total cost that has to be mobilized from the owner's resources, the slower construction will proceed.

How Housing Gets Produced Today

The lack of confidence in municipal planning and coordinating capabilities, the high cost of working capital and construction loans from commercial banks, the absence of long-term financing for households, together with the erosion of real wages, have made housing construction a risky stop-start activity from the point of view of the private sector.

The Batikent project, a middle income co-operative housing development located at the western periphery of Ankara, illustrates some of the difficulties private developers encounter. By 1990, the project is slated to develop 1,035 hectares of land for the construction of some

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50,000 low and high-rise dwelling units to serve a population of 300,000. Although the first 9,500 residential units have been completed and are now occupied and over TL 227 billion has been invested, the project has been delayed by the slow provision of trunk infrastructure by municipal authorities. Inadequate water supply and delays in constructing a sewerage system also pose serious problems.

A growing proportion of formal sector housing is sponsored by co-operatives, which increased from 8 percent of the total in 1975 to 14 percent in 1981 (Table III.5) and has probably increased since then. The co-operatives mobilize downpayments from members and contract for construction with builders. Many of the co-operatives tend to recruit middle and upper-income groups, usually those with a strong preference for multi-storied apartments. Because apartment units offer little or no flexibility for incremental expansion, the floor area is usually quite large, averaging  $113/m^2$ , in contrast to a national average for the housing sector as a whole of  $80.1m^2$ . These units are larger than those in other European countries where the average floor area is about  $70m^2$ . More than 95 percent of all formal sector housing production during the 1975-82 period was supplied either by private individuals (80-90 percent) or through housing co-operatives.

Because of constraints in financing and construction, informal gecekondu construction (illegal development), which accounts for about 50 percent of total housing production, will continue play a major role in housing construction.

Table III.5  
Comparison of Housing Completions Utilizing MHF Credit

Year	MHF Units Completed	Occupancy Permits	%MHF Funded of Completed Units (%)	MHF Disburse- ments Begun	Building Permits	%MHF Funded Units of all Units under Construction (%)
1984	7,350	122,580	6.0	142,659	189,486	75.0
1985	50,384	118,205	43.0	113,021	159,187	71.0
1986	84,262	168,597	50.0	158,964	392,825	40.0
1987	47,938	194,239	25.0	151,486	488,240	31.0
84-87			31.0			46.0
1988	<u>57,827</u>			<u>32,945</u>		46.0
Total to 7/31/88	247,761			599,075		

Source: State Institute of Statistics and Mass Housing Fund

Trying to discourage illegal settlements by not supplying infrastructure or public services has not been successful. By improving the supply of serviced land (using least cost solutions), the dynamism inherent in this type of development could be channeled into owner-built, incremental construction that would allow households to match their housing priorities with their capacity to pay over time.

Individual Housing is formal housing legally built, but usually not in a large scale development, subject to some planning regulations such as provision of infrastructure or community facilities. Housing in this category could take the form of a single unit built by an individual who owns the land. More typically however are units built under the "Yap-Sat" (Build/Sell) system prevalent in the 1960's and 1970's. The system was a response to the sudden urban-migrations which led to increased

densities in existing metropolitan areas with infrastructure. Under this scheme, owners of aging single family units would typically contract with a builder, signing over the right to develop the land, in return for perhaps one half of the new units. These could be sold, retained for investment purposes or held for other family members. The builder normally sold his share of the units.

#### House Building Cooperatives

Typically a co-op is established by a group of people related in some way, e.g., they work for the same organization or are members of the same union. Although membership must include at least seven, generally it is over 200. Most co-ops consist of middle- and upper-income families.

Upon co-op formation, the next step is to locate and purchase land, which is funded through initial payments of members. When design is completed and contract documents prepared, bidding occurs and the contract is awarded to a builder. Long term finance is obtained from banks acting as intermediaries for disbursing MHF credit. However, loans are approved for individual co-op members rather than for the co-op itself. Once the project is approximately 10 percent complete, i.e., reached ground level, credit disbursement can begin. Hence, the individual contributions prior to the beginning of construction are likely to be significant, 50-60 percent of house costs.

Construction proceeds under the supervision of the co-op acting through an architect and the bank, with speed of construction generally governed by the co-op members' ability to mobilize their own financial resources to supplement the credit available to them.

Normally monthly payments of members during construction are determined by the co-op and adjusted annually in response to continually escalating costs. Thus, members cannot determine the final cost of their housing unit until construction is complete, normally about 3 years after it begins. Coops generally are not equipped to deal with the complexity of actually constructing a housing project, and may choose to join a union of co-operatives. These organizations have been established in all major and many smaller urban areas, and provide assistance in land assembly and purchase, planning, project design and supervision as well as in securing finance. These services are available at cost to co-op union members. Dues are paid by the co-op to the union to carry out these services.

The cooperative movement began in 1965; however, in recent years its share of total housing has increased significantly, from 10 percent over the 1975-79 period to 20 percent by 1986. Much of this increase has occurred in response to the success of the cooperative union movement which has provided resources to co-ops by aiding them in obtaining land, securing finance and monitoring construction. A further impetus has been given to the growth of co-ops through the MHF which since 1984 has essentially made more financing available to them.

#### Housing and Urban Development Corporations

A new type of private housing development organization, the Housing and Urban Development Corporation (HUDC), was created in 1986 under the Sukurova Metropolitan Regional Development Project. Under the new system, the municipality receives loans from the MHF to finance the expropriation of land for development. The land is then planned and

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subdivided and services provided by the HUDC prior to its engaging contractors to build housing units. HUDC either approves or provides designs to builders. It also sets the standards for infrastructure and for housing suitable for the population it is directed to serve. The principal market the HUDC intends to reach is low- and middle-income families, although expanded area plans may include development of housing for higher income families as well.

Compared to other privately produced housing it appears that considerable savings have been realized with this approach. The HUDC's have developed standards more appropriate to lower income families, have built a larger percentage of smaller units which are completed in approximately 12 months and achieved savings associated with large scale projects.

#### Private Developers

Private developers construct formal sector private housing, normally in large scale developments. Speculative residential development tends to cater to high income levels where a ready market exists.

#### Public (Civil Servant) Housing

Units included under public housing include housing provided by central government ministries for their employees as part of their total compensation package. State Economic Enterprises (government-owned corporations) also provide housing for employees. Similar to other housing under construction, they are typically 100m<sup>2</sup> units in apartment buildings.

Normally central government ministries contract with builders to construct a specific number of units. In some cases, ministries may purchase entire buildings constructed by developers. Also included under public housing are disaster projects carried out by public agencies.

## Appendix IV

### FINANCIAL INTERMEDIATION IN THE HOUSING SECTOR

From 1959-1983 the only bank legally empowered to extend credit for housing was Turkish Emlak Kredit Bankasi (EKB) or Real Estate Bank of Turkey, which raises most of its resources through deposits. In addition, the Worker's Social Security Fund (SSK) has played a role and provides credit to its members.

The SSK, founded in 1956, in addition performs social services for its members, as well as providing credit. Over the 1962-84 period, 4,152 cooperatives received SSK credit for a total of 19,934 housing units. In addition, the SSK directly constructed 10,508 housing units from 1962 to 1984. With the establishment of the House Development and Public Participation Administration in 1984, direct lending and construction by SSK was discounted with further applications for SSK credit made through the Mass Housing Fund to be used to supplement that source of credit.

There are also pension funds for the military and self-employed which provide very minimal levels of funding for housing.

Until 1983, the EKB was the only bank legally empowered to lend money for housing. It can also provide commercial and agricultural credits, and has provided construction credit to contractors operating overseas.

With a reform in interest rate policy in 1980, real interest rates on time deposits increased from highly negative to highly positive. This required EKB to decrease its housing credit activity as mortgage interest rates were fixed well below the rate of inflation. EKB also

diversified, and began to aggressively solicit commercial loans contributing to 1980 declines in both housing loans and housing investment.

The EKB has also served as a channel for government resources for various specialized housing programs. Until 1988, nine different housing credit programs were available, all of which offered concessionary fixed rates. Typically, the EKB would originate such loans for a fee and service the loan portfolio. The flow of governmental resources has been the main reason why EKB was able to remain in the mortgage finance business.

Table IV.1

EKB Loans Outstanding  
(TL Billion)

	81	82	83	84	%	85	%	86	%
Commercial Credit	22.3	37.2	49.2	60.4	29.0	84.8	19.0	211.9	23.8
Real Estate Credit	8	12.0	21.1	28.7	.15	41.2	9.0	80.1	8.9
Real Estate Credit (MHF and Other Resources)	9.5	18.9	40.8	115.8	55	325.3	72.0	601.9	67.0
Total Credit	39.8	68.1	111.10	204.90	100	451.3	100	893.90	100

The Emalak Credit Bank (EKB) has raised most of its resources through deposits. During the early 1980's it began to pay positive real interest rates, and deposits increased from TL 51 billion in 1981 to TL 235 billion in 1984. However, with the increasing nominal cost of funds, EKB was not able to provide affordable fixed payment mortgages or sustain positive real lending rates. This led to a sharp decline in

housing loans and a sharp increase in commercial lending by EKB. By 1984 only 22 percent of EKB's outstanding loans were mortgage loans financed from its own resources, and all of these loans were at highly subsidized fixed lending rates. This sharp drop in mortgage lending explains a large part of the decline of housing investment during the early 1980's.

EKB has now merged with another government-owned commercial bank and changed its name to Konut Bank. Konut Bank is the major servicing agent for mortgage loans from the Mass Housing Fund. EKB now lends only very small amounts of its own resources for housing, and this is limited to housing projects which EKB itself sponsors. At present it appears that EKB's heavily subsidized provision of mortgage credit is being constrained by Central Bank restrictions on the availability of credit.

With this merger, other mortgage lending programs offered by EKB ceased operations. Only the Building Savings Program was maintained for individuals who had enrolled prior to 1988. Under this program individuals not currently owning a home may open a savings account to accumulate funds for home purchase. When they have accumulated 25 percent of the amount to be borrowed and the account has been open for at least one year, participants in the program can become eligible for a loan up to TL 3 million at 25 percent for 15 years. The credit must be used to purchase a unit no older than one year and no larger than 100m<sup>2</sup>.

The creation of the MHF substantially increased the flow of resources for housing to EKB. Of its total mortgage credits in 1984, 80 percent were financed with governmental fund resources. By 1987, this figure had risen to over 90 percent. The EKB has served as the major

channel for MHF resources. In 1987, the private banking sector was permitted to participate in the mortgage lending program. Two private banks, Anadolu Bankasi and Pammukbank began disbursement of a small amount of MHF funds.

The Workers Social Security Fund (WSSF)

WSSF has made limited investments in residential mortgages, about 3 percent of its assets in 1984. Since 1960 it has financed about 250,000 dwelling units through about 5000 cooperatives. It has provided preferential interest rates (8-10 percent) which have given it a deeply negative real return. The strict lending criteria have set tight limits on the amount of credit it can make available for housing.

The SSK has been making housing loans for 25 years. Through the end of 1984 it had provided credits to 4,416 cooperatives containing 227,106 housing units. The total for financing amounted to TL 72.9 billion. SSK presently has commitments to finance 464 coops with 38,865 units currently being constructed. A person must be a contributor to the SSK to be eligible for a loan.

In the past an SSK loan covered most of the cost of the house. But this is no longer so and SSK now offers two types of credits. For houses up to 85 sq. meters, the repayment period is 18 years, from 85-100 sq. meters (the maximum) it's only 14 years. The maximum loan is TL 900,000. For the first TL 600,000, the interest rate is 8 percent, for the next TL 300,000 the rate is 15 percent. At one time SSK developed some of its own projects, but no longer. However, of the total 227,000 units financed to date by SSK, only 10,000 were developed directly by SSK. All loans are made for cooperative projects.

SSK makes payments for health, child care, job-related injury and old age pensions. Contributions come from both employers and employees. The fund now amounts to TL 1/2 trillion; one-third of the population is covered. The SSK has about 50,000 employees.

Of the TL 72.9 billion in housing loans that have been made, TL 40 billion has been repaid, TL 15 billion is still disbursing and TL 17 billion is outstanding. Most of the Fund's investments are in government bonds (30 percent), deposits in banks and real estate investments (about 80 hospitals and commercial buildings where it receives rent).

To get a housing loan from SSK the following conditions apply:

The individual must have paid into the Fund for 5 years, he should not already own a house and he must belong to a cooperative.

The cooperative must have at least 30 member families, it must have land and plot sizes and it must be at maximum utilization. It must also have the approval of the municipality. Cooperatives make applications for loans in March.

The stated reason for SSK's limit of TL 900,000 per loan is to spread around available funds. There is some inconsistency here however. It lends at low rates of interest (up until recently it was only 4 percent) because housing is a social need. However, the proportion of SSK's resources going to its housing lending program is limited because there is such a low rate of return. Because TL 900,000 covers such a small percentage of today's housing cost (an average house cost of TL 3.5 million was cited) fewer and fewer people can afford the down payment.

## Appendix V

### ESTIMATES OF THE WELFARE COST OF INFLATION AND CREDIT CONTROLS IN TURKEY

The failure to provide an indexed financial instrument in the presence of the high and variable inflation in Turkey in recent years means that inflation imposes a tax on financial instruments in the same manner as official government taxes on other activities. One implication of this "inflation tax" is that it creates an incentive for resources to move from the formal sector of the Turkish economy to other sectors to evade the tax. Because of this resource movement, an inefficiency, or welfare cost is created, and it is possible to measure this welfare cost. In the first section, this appendix discusses the welfare cost and presents estimates of its magnitude. The details of its calculation are contained in the second section.

#### The Cost of Inflation Taxes

The nature of the welfare cost may require some clarification. The Turkish economy can be divided into two broad sectors: a "formal sector" in which resources are taxed by government taxes and by inflation, and an "informal sector" in which factors are untaxed. This formal sector represents activities that occur outside the formal markets measured in official government statistics. It has been called a variety of names in other countries, such as the underground, shadow, irregular, subterranean, or black economy, names that reflect the clandestine nature of the goods and services produced. The magnitude of this informal sector is difficult to estimate in any country. Still, there is much evidence to suggest that the informal sector in many

countries has grown in absolute and relative size over time. Anecdotal evidence suggests that the informal sector in Turkey has behaved in a similar way.

In Turkey, this informal sector has arisen for several reasons. One cause is the presence of government taxes -- mainly income taxes and domestic and international taxes -- on the returns to factors in the formal sector, taxes that can be evaded by working in the underground economy. A second and related cause is the inflation that has persisted in Turkey in recent years. There is much empirical evidence that monetary and financial instruments can be viewed as a factor of production in the same manner as other inputs when their returns are not indexed, or adjusted in a systematic way to maintain a constant, real rate of return. Inflation therefore acts in exactly the same way as a tax on monetary and financial instruments. Although money is also used in the informal sector, the nature of this factor differs for the two sectors. In the formal sector, "money" consists largely of cash and savings deposits, especially those maintained in financial institutions; in the informal sector "money" is made up of gold, silver, foreign exchange, precious gems, and other forms of wealth that serve both as a medium of exchange and as a store of value that can be easily hidden and readily transferred in and out of the country. With no indexation of formal sector financial instruments, inflation is therefore largely a tax on money in the formal sector. Consequently, like official government taxes, inflation also drives factors into the informal sector.

The existence of a sector to which resources may move to avoid inflation and the official government taxes means that these taxes drive a wedge between the returns to factors of production in the different sectors. For example, if labor is mobile between the sectors, then labor will move between these sectors until the net-of-tax return in the formal sector equals the (untaxed) return in the informal sector. However, the gross-of-tax return to labor in the formal sector measures the social productivity to labor, and this will then be higher in the formal sector by the amount of the tax. The tax therefore encourages overallocation of resources to untaxed activities and so generates a welfare cost. A similar welfare cost is created by taxes on other mobile factors. Most notably, the inflation tax on money creates a welfare cost.

The welfare cost can be measured by use of a two-sector, three-factor general equilibrium model of the Turkish economy. The two sectors are the formal and the informal sectors; the three factors are capital, labor, and money. All factors are assumed to be taxed in the formal sector, and untaxed in the informal sector. The model is solved analytically and numerically, using 1986 data on the Turkish economy where appropriate. The details of the model, its solution, and its specification are presented below.

Estimates of the welfare cost indicate that the inefficiencies are generally quite large. Two sets of estimates are presented, one based upon the use of marginal tax rates on the factors of production, and one that uses average tax rates. The welfare costs based upon the marginal tax rates exceed six percent of formal sector output in many cases and

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never falling below one percent of output. Relative to tax revenues, the estimates are even larger, and in some cases are greater than 50 percent of revenues. The marginal tax rate welfare cost varies with specific parameter values. Nevertheless, the estimates are always quite large.

The welfare costs that use the average tax rates are significantly smaller than those using the marginal tax rates. These estimates are generally between 0.5 and 1.5 percent of formal sector output, and between 5 and 10 percent of government tax collections. However, the average tax rate estimates are still substantial.

Although all taxes contribute to the welfare cost, the inflation tax on money has a particularly large impact. A reduction in the tax on money therefore can substantially affect the welfare cost from the remaining taxes. Using the marginal tax rate estimates, a reduction of 50 percent in the tax on money reduces the welfare cost by 40 to 57 percent, depending upon the parameter values; a reduction in the tax to 0 lowers the welfare cost by 59 to 68 percent. Clearly, there are substantial gains to be realized by a reduction in the inflation tax on money, and the largest gains are generated by the initial reductions in the inflation tax. With the average tax rate approach, a reduction in the inflation tax rate to 0 also has a major impact on the welfare cost, reducing the estimates by 46 to 53 percent.

It must be stressed that these estimates are only rough orders of magnitude. Still, as discussed below, there are good reasons for believing that the welfare cost estimates have some validity. Consequently, government policies that drive resources into the informal

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sector seem likely to create a welfare cost that is substantial, and policies that reduce these taxes--especially an indexation program that reduces the inflation tax on money--will generate a major gain in welfare.

#### Measuring Welfare Cost

This section discusses in detail the methods used to estimate the welfare cost of an economy in which the interaction of inflation, taxes, and a non-indexed financial system drive resources from the formal sector of the economy to the untaxed, informal sector. The model used is an extension of the general equilibrium model of tax incidence first introduced by Harberger (1962) and extended by McLure, Mieszkowski, Shoven, Whalley, and others.<sup>1</sup> It has been used by Harberger (1964, 1966), Roskin (1976), Alm (1985) and others to measure the welfare cost of various government tax policies. It is used here to measure the welfare cost that arises because inflation and taxes affect in different ways the returns to factors of production in the various sectors of an economy and so create incentives for these factors to move between the sectors. In this process an inefficiency, or welfare cost, is created.

The model is based upon the assumption that the Turkish economy may be divided into two broad sectors: informal sector, in which factors of production are taxed in some way, and an informal sector, in which these factors are untaxed. This informal sector represents activities that occur outside the formal markets measured in official statistics.

#### Theoretical Model

The Turkish economy is divided into two sectors: the formal sector (X) and the informal sector (Y). Demand for each sector's output is a

function of relative prices, and all agents, including government, have the same marginal and average propensity to consume the commodities. Each good is produced under competitive conditions with a linear homogeneous production function that depends upon the amounts of capital (K), labor (L), and financial instruments, called "money" (M) for convenience. Capital and labor are fixed in total supply and are perfectly mobile between the sectors:<sup>2</sup> that is, the nature of capital and labor is assumed to be identical across sectors. Money also enters the production function of each sector. However, the nature of this factor differs for the two sectors. In the formal sector, money consists of cash and savings deposits, especially those maintained in financial institutions; in the informal sector, money is made up of gold, silver, precious gems, and other forms of wealth that serve both as a medium of exchange and as a store of value that can be easily hidden and readily transferred in and out of the country.<sup>4</sup> The supplies of money to the formal and the informal sector are perfectly elastic. All physical units are chosen such that initial prices are unity.

Since factors in the informal sector are assumed to be untaxed, there are only three taxes in this economy: a tax on capital ( $T_k$ ), a tax on labor ( $T_l$ ), and a tax on money ( $T_m$ ) in the formal sector. The only other tax that might be imposed is a tax on consumption of formal sector output; however, this tax may be seen alternatively as an equal tax on capital, labor, and money in sector X. Inflation and taxes therefore create an incentive for capital, labor, and money to flow out of the formal sector, a movement that generates a welfare cost.

In differential equation form (where  $\wedge$  denotes the percentage change

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in the relevant variable), the Turkish economy can be represented as follows:

- (1)  $\hat{X} = E(\hat{P}_X - \hat{P}_Y)$
- (2)  $\hat{X} = f_K \hat{K}_X + f_L \hat{L}_X + f_M \hat{M}_X$
- (3)  $\hat{K}_X - \hat{L}_X = S_{XKL}(\hat{r} + T_K - \hat{w} - T_L)$
- (4)  $\hat{K}_X - \hat{M}_X = S_{XKM}(\hat{r} + T_K - \hat{s} - T_M)$
- (5)  $\hat{K}_Y - \hat{L}_Y = S_{YKL}(\hat{r} - \hat{w})$
- (6)  $\hat{K}_Y - \hat{M}_Y = S_{YKM}(\hat{r} - \hat{z})$
- (7)  $K_X \hat{K}_X + K_Y \hat{K}_Y = 0$
- (8)  $L_X \hat{L}_X + L_Y \hat{L}_Y = 0$
- (9)  $\hat{s} = 0$
- (10)  $\hat{z} = 0$
- (11)  $\hat{P}_X = f_K(\hat{r} + T_K) + f_L(\hat{w} + T_L) + f_M(\hat{s} + T_M)$
- (12)  $\hat{P}_Y = g_K \hat{r} + g_L \hat{w} + g_M \hat{z}$
- (13)  $\hat{P}_Y = 0$

where

$E =$  the compensated elasticity of demand for X with respect to a change in the relative price ( $P_X/P_Y$ ) of good X, defined to be nonpositive

$P_i =$  the price of good i (i = X, Y)

$r =$  the return to capital

$w =$  the return to labor

$s =$  the return to money in sector X

$z =$  the return to money in sector Y

$f_j =$  the initial share of factor j in sector X (j = K, L, M)

$g_j$  = the initial share of factor  $j$  in sector  $Y$  ( $j$  and  $k$  in sector  $i$ , defined to be nonpositive ( $i = X, Y$ ;  $j, k = K, L, M$ ))

$T_j$  = the tax on factor  $j$  in sector  $X$ .

$S_{iKj}$  = Elasticity of substitution between factor  $j$  ( $j = L, M$ ) and capital ( $K$ ) in sector  $i$  ( $i = X, Y$ ).

Equation (1) expresses the percentage change in compensated demand for good  $X$  as a function of the percentage change in the relative prices of  $X$  and  $Y$ . Equation (2) describes the change in output of  $X$  that result from changes in factor usage in the sector. Equation (3) through (6) relate the change in factor proportions in the two sectors to changes in relative factor prices via the elasticity of substitution in production. Equations (7) and (8) follow from the assumption of fixed factor supplies of capital and labor, and equations (9) and (10) are implied by the assumption of perfectly elastic supplies of money to the two sectors. Equations (11) and (12) show the relationships between changes in factor prices including taxes where appropriate) and the resulting changes in product prices. Equation (13) defines the price of good  $Y$  as the numeraire.<sup>4</sup>

These equations constitute a thirteen-equation, thirteen-unknown system, where the unknowns are  $\hat{X}$ ,  $\hat{K}_X$ ,  $\hat{L}_X$ ,  $\hat{M}_X$ ,  $\hat{K}_Y$ ,  $\hat{L}_Y$ ,  $\hat{M}_Y$ ,  $\hat{P}_Y$ ,  $\hat{W}_Y$ ,  $\hat{r}$ ,  $\hat{w}$ ,  $\hat{s}$ , and  $\hat{z}$ . This system can be reduced by substitution to a five-equation, five-unknown system, which can then be solved for the remaining unknowns by Cramer's Rule. Expressed in matrix form, the reduced system becomes:

$$\begin{array}{ccccc|c|c}
 -E[f_K - f_L(g_K/g_L)] & f_K & f_L & f_M & 0 & \hat{r} & E(f_K T_K + f_L T_L + f_M T_M) \\
 -S_{XKL}(g_K + g_L)/g_L & 1 & -1 & 0 & 0 & \hat{K}_X & S_{XKL}(T_K - T_L) \\
 -S_{XKM} & 1 & 0 & -1 & 0 & \hat{L}_X & S_{SKM}(T_K - T_M) \\
 -S_{YKL}(g_K + g_L)/g_L & -K_X/K_Y & L_X/L_Y & 0 & 0 & \hat{M}_X & 0 \\
 -S_{YKM} & -K_X/K_Y & 0 & 0 & -1 & \hat{M}_Y & 0
 \end{array}$$

Measuring the welfare cost of inflation and taxes requires knowledge of the responses of  $K_X$ ,  $L_X$ , and  $M_X$  to the various taxes. This information is contained in the solutions for  $\hat{K}_X$ ,  $\hat{L}_X$ , and  $\hat{M}_X$ . To illustrate, consider the tax on capital in sector X, or  $T_K$ . In the absence of the tax, factor mobility will assure that the equilibrium price of capital will be the same in both sectors. In the presence of the tax, however, capital will move from sector X until the gross-of-tax price of capital in X exceeds the price of capital in Y by the amount of the tax. Capital thus moves from higher productivity uses in the formal sector to lower valued uses in the informal sector. The welfare cost of this single tax on capital in sector X is measured by  $(-1/2 T_K \Delta K_X)$ . When there are also taxes on labor and money in X, the combined welfare cost becomes  $(-1/2 T_K \Delta K_X - 1/2 T_L \Delta L_X - 1/2 T_M \Delta M_X)$ . Here, however,  $\Delta K_X$ ,  $\Delta L_X$ , and  $\Delta M_X$  represent the changes in the factors that result from all taxes simultaneously. Estimation of the welfare cost therefore requires knowledge of these total factor responses. Assuming that the relevant derivatives are constant, Harberger (1964) and others have shown that the welfare cost is measured by: (14)  $WC = \frac{1}{2} \left[ \frac{\partial K_X}{\partial T_K} T_K^2 + \frac{\partial K_X}{\partial T_L} T_L T_K + \frac{\partial K_X}{\partial T_M} T_M T_K + \frac{\partial L_X}{\partial T_K} T_K T_L + \frac{\partial L_X}{\partial T_L} T_L^2 + \frac{\partial L_X}{\partial T_M} T_M T_L + \frac{\partial M_X}{\partial T_K} T_K T_M + \frac{\partial M_X}{\partial T_L} T_L T_M + \frac{\partial M_X}{\partial T_M} T_M^2 \right]$  where, for example,  $\partial K_X / \partial T_K$  is the partial derivative of  $K_X$  with respect to  $T_K$ . These partial derivatives allow for all general

equilibrium adjustments in production and in demand, and so may be viewed as "reduced form" coefficients that show the equilibrium responses of capital, labor, and money in the formal sector to changes in the taxes. Because the solution of the system of equations gives  $K_x$ ,  $L_x$ , and  $M_x$  as a function of the three taxes (and the other parameters of the system), these partial derivatives are easily and directly calculated.

#### Specification of the Theoretical Model

Measurement of the welfare cost requires estimates of the amounts and the shares of capital, labor, and money in the two sectors, the elasticities of demand and of substitution, and the tax rates on factors in the formal sector. These estimates are based upon the 1986 Turkish economy. Some of these parameters can be obtained directly from official government statistics; others -- especially those for the informal sector -- can only be generated by speculation. Some care is taken throughout to ensure that the resulting calculation of the welfare cost is biased downward.

The amounts of capital, labor, and money in the formal sector are obtained from official government national income statistics by first determining the gross-of-tax income of the three factors and then choosing units of the factors so that one unit is the amount that earns 1.00 TL. Gross domestic product in 1986 is 39,287.7 billion TL.<sup>5</sup> It is assumed that this represents output in the formal sector only; it is also assumed that this measures the amounts paid to capital and labor only. The factor shares of capital, labor, and money in sector X have been estimated to equal .36, .52, and .12, respectively. The total

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amount of sector X output is then calculated by dividing gross domestic product by the sum of the factor shares of capital and labor, or 39,287.7 billion TL/ (.36+.52). Total formal sector output therefore equals 44,645.1 billion TL. Using the factor shares, the amounts paid to capital, labor, and money equal 16,072.2, 23,215.5 and 5,357.4 billion TL, respectively. Because units of factors are chosen so that one unit earns 1.00 TL, the amounts of capital, labor, and money in the formal sector are 16,072.2, 23,215.5, and 5,357.4 billion, respectively.

The tax rates on the factors of production consist of two components: the tax that arises from official government revenues and the one that is due to inflation. Estimates of the tax rates are generated in two ways. One measures the marginal rate of taxation, and one is based upon the average rate of taxation.

The marginal tax rates are -.14, .39, and .84 for capital, labor, and money, respectively. Comparisons of these estimates with those that result from a reduction in the tax on money to .42 and 0 are also made.

The average tax rates are calculated by first assigning the burden of Turkish taxation to capital, labor, and money, and then dividing the tax burden on each factor by its income. Total consolidated government tax revenues in 1986 are 5,990.7 billion TL.<sup>6</sup> These revenues consist of individual income taxes (2,103.7 billion TL), corporate income taxes (949.2 billion TL), property taxes (29.9 billion TL), domestic taxes on goods and services (2,173.9 billion TL), taxes on international trade (465.2 billion TL), and other taxes, mainly stamp duties (268.,8 billion TL). Individual income taxes are assumed to be borne by capital and labor in the formal sector in proportion to their shares of income; the

corporate income and the property taxes are assumed to be borne entirely by capital; and domestic taxes, international taxes, and other taxes are assumed to be borne by all three factors in proportion to their shares of income. The tax burden on capital then equals capital's share of the individual income tax ( $.4091 \times 2,103.7$  billion TL, or 860.6 billion TL);<sup>7</sup> plus the full amount of the corporate income and the property taxes (949.2 and 29. billion TL); plus capital's share of domestic taxes on goods and services, taxes on international trade, and other taxes ( $.36 \times 2,173.9$  billion TL +  $.36 \times 465.2$  billion TL +  $.36 \times 268.8$  billion TL, or 1,046.8 billion TL, and the average tax rate on capital is .180 (or 2886.6 billion TL/16,072.2 billion TL). The average tax rate on labor is derived in a similar manner, and equals .119.

For capital and labor in the formal sector, the average tax rate stems entirely from the burden of government tax collections. For money, however, the average tax rate consists of that part due to government revenues plus that part due to the inflation tax on financial instruments. The first component is calculated in the same manner as the tax rate on capital and labor, and equals .065. The second component depends upon the reduction in the real interest rate caused by inflation. When inflation reduces the real interest rate, inflation is reducing the yield on money and so is imposing a tax on the holding of money; only when the real interest rate is unaffected by inflation is there no inflation tax on money. The inflation tax therefore equals the difference between the real interest rate that would be earned by financial assets in the absence of inflation and the actual real rate received by money.

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It is assumed that the real interest rate with zero inflation equals 10 percent. The actual real interest rate is calculated as  $(i-p)/(1+p)$ , where  $i$  is the nominal interest rate and  $p$  is the rate of inflation. For a given rate of inflation, the real rate therefore depends upon the nature of the deposit. In December 1986 the actual nominal and real returns on various lengths deposits were:

Interest Rates and Terms

<u>Months</u>	<u>Sight</u>	<u>1 Month</u>	<u>3 Month</u>	<u>6 Month</u>	<u>12 Month</u>
Nominal Rate	10.0%	29.0%	36.0%	41.0%	48.0%
Real Rate	-18.3%	-4.2%	1.0%	4.8%	10.0%
Inflation Rate	28.3%	14.2%	9.0%	5.2%	0.0%
Total Tax on $M_x$	34.8%	20.7%	15.5%	11.8	6.5%

where the rate of inflation is measured by the consumer price index and equals 34.6 percent for 1986.<sup>8</sup> The inflation tax equals the difference between 10.0 percent and the actual real rate on the deposit, and the total average tax rate on money -- from official revenues plus inflation -- equals the inflation tax plus the official tax burden on money (or .065). The total average tax  $T_m$  therefore ranges from .348 for sight deposits to .065 for 12 month time deposits. The welfare cost estimates are presented for values of the average tax rate on money of .348 and .207, which correspond to inflation taxes of 29.3 and 14.2; comparisons

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of these estimates with those generated by a 0 inflation tax on money are also made.

In the formal sector many of the required parameters may be measured directly. However, the informal sector is largely unobservable, which makes the selection of parameter values particularly difficult. The procedure followed here is to select parameters based both upon speculation and upon the little empirical evidence that exists, and then to examine the impact of variations in these parameters upon the resulting welfare cost estimates.

The size of the informal sector is unknown. It has been estimated to be as large as 50 percent of official output in some countries. For Turkey, the informal sector is assumed to be 15 percent of gross domestic product. Sensitivity analysis indicates that welfare cost estimates do not vary substantially with variations in the size of the sector.

Like the size of the informal sector, its factor composition is also largely unknown. Anecdotal evidence from other countries suggests that the informal sector is likely to be both more labor and more money intensive than the formal sector. The factor proportions for labor and money in sector Y are therefore assumed to be 20 percent greater than their proportions in the formal sector; the share of capital in Y is calculated as a residual. Again, sensitivity analysis indicates that small variations in factor proportions do not have a significant effect on welfare cost estimates.

There are no available estimates for the compensated elasticity of demand (E). Several values are chosen;  $-1/2$  and  $-1$ . Estimates of the

elasticities of substitution are also difficult to obtain. Evidence from other countries suggests that the elasticities are likely to vary between 0 and -1. Various combinations of elasticities that fall within these ranges are used. Variations in the elasticities of demand and of substitutions have a more significant impact on the welfare cost estimates. Table 1 at the end of the appendix summarizes the various parameter values.

### Welfare Cost Estimates

Estimates of the welfare cost using the marginal tax rate are given in Table 2, and estimates based upon the average tax rate are in Tables 3 and 4. The welfare costs based upon the marginal tax rate are enormous, exceeding 6 percent of formal sector output in many cases and never falling below 1 percent of output. Relative to tax revenues, the estimates are even larger, and in some cases greater than 50 percent of revenues. The welfare cost increases with a greater elasticity of demand and with greater elasticities of substitution between the various factors of production; the estimates are particularly affected by changes in the elasticities of substitution in the formal sector.

Because the average tax rates are less than the marginal tax rates, the welfare costs based upon the average tax rates are significantly smaller than those using the marginal tax rate (Tables 3 and 4). These estimates are generally between .5 and 1.5 percent of formal sector output and between 5 and 10 percent of government tax collections. However, though smaller than the marginal tax rate estimates, the average tax rate estimates are still substantial. They are also affected in the same way as the marginal tax rate estimates by changes

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in the various elasticities. Note that the welfare cost increases with the inflation tax on money (Table 4 versus Table 3).

The welfare cost is determined by all three taxes in the sector. Still, a reduction in the tax on money has a particularly large impact on the welfare cost measures and, for the marginal and the average tax rate estimates, as shown in the table. Using the marginal tax rate estimates, a reduction in the tax on money from 84 percent to 48 percent reduces the welfare cost by 40 to 57 percent, depending upon the elasticities of demand and of substitution; a reduction in the tax to 0 lowers the welfare cost by 59 to 68 percent. Clearly, there are substantial gains to be realized by a reduction in the inflation tax on money, and the largest gains come from the initial reductions in the inflation tax. With the average tax rate approach, a reduction in the inflation tax to 0 also has a major impact on the welfare cost, reducing the estimates by 46 to 53 percent.

It must be stressed that these estimates are only rough orders of magnitude. After all, if the size the informal sector cannot be measured precisely, then the inefficiencies created by this sector also cannot be measured precisely. In addition, various features of the model affect the welfare cost estimates, though possibly in offsetting ways, and it is difficult to determine the magnitude of these factors. There are some considerations that are omitted from the model here that suggest that the welfare cost estimates are too large. Employment in the informal sector for people who would otherwise be unemployed is welfare-increasing, as is production of informal sector output that overcomes inefficient government regulation. However, there are also

many elements working to lower the estimates below the true welfare cost. These include the high level of sectoral aggregation; the absence of any dynamic or intertemporal inefficiency: the omission of resources used by individuals to minimize (or evade) tax burdens, to seek and maintain informal sector rents, and to secure a share of tax revenues; and the exclusion of resources used by governments to collect taxes and to limit tax avoidance and tax evasion. Moreover, estimates are presented for a wide range of parameter values, and, although the magnitude of the loss varies, it is often quite large. In sum, government policies that drive resources into the informal sector seem likely to create a welfare cost that is generally substantial, and policies that reduce these taxes -- especially an indexation program that reduces the inflation tax on money -- will generate a major gain in welfare.

Table 1

PARAMETER DEFINITIONS AND VALUES

<u>Parameter</u>	<u>Definition</u>	<u>Value</u>
$f_K$	Share of capital in sector X	.36
$f_L$	Share of labor in sector X	.52
$f_M$	Share of money in sector X	.12
$g_K$	Share of capital in sector Y	.24
$g_L$	Share of labor in sector Y	.62
$g_M$	Share of money in sector Y	.14
$K_x$	Amount of capital in sector X	16,072.2

<u>Parameter</u>	<u>Definition</u>	<u>Value</u>
$L_X$	Amount of labor in sector X	23,215.5
$M_X$	Amount of money in sector X	5,357.1
X	Amount of output in sector X	44,645.1
$K_Y$	Amount of capital in sector Y	2,678.7
$L_Y$	Amount of labor in sector Y	6,920.0
$M_Y$	Amount of money in sector Y	1,562.6
Y	Amount of output in sector Y	11,161.3
E	Compensated elasticity of demand	-.5,-1
$S_{XKL}$	Elasticity of substitution between capital and labor in sector X	-.5,-1
$S_{XKM}$	Elasticity of substitution between capital and money in sector X	-.5,-1
$S_{YKL}$	Elasticity of substitution between capital and labor in sector Y	0,-.5,-1
$S_{YKM}$	Elasticity of substitution between capital and money in sector Y	0,-.5,-.1
$T_K$	Tax rate on capital in sector X:	
	Marginal Tax Rate	-.14
	Average Tax Rate	.1796
$T_L$	Tax rate on labor in sector X:	
	Marginal Tax Rate	.39
	Average Tax Rate	.1187
$T_M$	Tax rate on money in sector X:	
	Marginal Tax Rate	.84
	Average Tax Rate	.207, .348

Table 2

WELFARE COST ESTIMATES: MARGINAL TAX RATE  
(TL amounts in billions of TL)

<u>S</u> <u>and</u> <u>XKL</u> <u>and</u> <u>YKM</u>	<u>S</u> <u>and</u> <u>YKL</u> <u>and</u> <u>YKM</u>	<u>E</u>	<u>WC</u>	<u>WC as percent of</u> <u>of</u> <u>Formal Sector</u> <u>Output</u>	<u>WC as percent of</u> <u>of Taxes</u>
-1	-1	-1/2	2123.1 TL	4.8%	35.4%
-1	-1	-1	3101.1	6.9	51.8
-1	-1/2	-1/2	2036.3	4.6	34.0
-1	-1/2	-1	3039.6	6.8	50.7
-1	0	-1/2	1932.5	4.3	32.3
-1	0	-1	2966.1	6.6	49.5
-1/2	-1	-1/2	1599.1	3.6	26.7
-1/2	-1	-1	2482.6	5.6	41.4
-1/2	-1/2	-1/2	1550.7	3.5	25.9
-1/2	-1/2	-1	2461.3	5.5	41.1
-1/2	0	-1/2	1483.1	3.3	24.8
-1/2	0	-1	2432.4	5.4	40.6

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Table 3

WELFARE COST ESTIMATES AVERAGE TAX RAAE  
AND INFLATION TAX OF 28.2 PERCENT  
(TL amounts in billions of TL)

<u>S</u> <u>and</u> <u>XKL</u> <u>YKM</u>	<u>S</u> <u>and</u> <u>YKL</u> <u>YKM</u>	<u>E</u>	<u>WC</u>	<u>WC as percent of</u> <u>of</u> <u>Formal Sector</u> <u>Output</u>	<u>WC as percent of</u> <u>of Taxes</u>
-1	-1	-1/2	398.3 TL	0.9%	6.6%
-1	-1	-1	675.7	1.5	11.3
-1	-1/2	-1/2	395.5	0.9	6.6
-1	-1/2	-1	669.5	1.5	11.2
-1	0	-1/2	392.0	0.9	6.5
-1	0	-1	662.2	1.5	11.1
-1/2	-1	-1/2	342.8	0.8	5.7
-1/2	-1	-1	608.3	1.4	10.2
-1/2	-1/2	-1/2	337.9	0.8	5.6
-1/2	-1/2	-1	596.0	1.3	9.9
-1/2	0	-1/2	331.1	0.7	5.5
-1/2	0	-1	579.3	1.3	9.7

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Table 4

WELFARE COST ESTIMATES: AVERAGE TAX RATE  
AND INFLATION TAX OF 14.1 PERCENT  
(TL amounts in billions of TL)

<u>S</u> <u>and</u> <u>XKL</u> <u>and</u> <u>YKM</u>	<u>S</u> <u>and</u> <u>YKL</u> <u>and</u> <u>YKM</u>	<u>E</u>	<u>WC</u>	<u>WC as percent of</u> <u>of</u> <u>Formal Sector</u> <u>Output</u>	<u>WC as percent of</u> <u>of Taxes</u>
-1	-1	-1/2	248.9 TL	0.6%	4.1%
-1	-1	-1	465.8	1.0	7.8
-1	-1/2	-1/2	242.4	0.5	4.0
-1	-1/2	-1	458.6	1.0	7.7
-1	0	-1/2	258.8	0.5	4.0
-1	0	-1	452.2	1.0	7.5
-1/2	-1	-1/2	289.9	0.5	4.0
-1/2	-1	-1	449.1	1.0	7.5
-1/2	-1/2	-1/2	232.9	0.5	3.9
-1/2	-1/2	-1	437.8	1.0	7.3
-1/2	0	-1/2	226.1	0.5	3.8
-1/2	0	-1	422.4	0.9	7.1

ENDNOTES

1. This work is discussed in several useful surveys. See McLure (1975), Shoven and Whalley (1985), and Kotlikoff and Summers (1988).
2. Because of perfect mobility, net factor returns must be equalized across sectors, where factor returns are assumed to be adjusted for the presence of risk premia in the informal sector.
3. It is likely that cash is also a form of money that is used in the informal sector. However, in order to keep a clear distinction between the two sectors, it is assumed that cash is used only in the formal sector.
4. Equations similar to these are derived and discussed by Harberger (1962) and Shoven and Whalley (1972). See also Alm (1985).
5. Turkey Country Economic Memorandum, Towards Sustainable Growth, World Bank, July 19, 1988.
6. Government Financial Statistics Yearbook, 1988, International Monetary Fund.
7. Since the individual income tax is borne by capital and labor, capital's share of the burden is  $.36/ (.36+.52)$ , or .4091.
8. Nominal interest and inflation rates are obtained from Turkey Country Economic Memorandum, Towards Sustainable Growth, World Bank, July 19, 1988, pp. 26-27.

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## Appendix VI

### THE MASS HOUSING FUND

Concerned by the slump in housing investment and construction, in 1984 the Government created the Public Participation and Housing Development Administration (TKF). This is a tax financed "fund" that derives revenues from special earmarked taxes (see Appendix IV). A major responsibility of the TKF is to manage the Mass Housing Fund (MHF) which receives a portion of the earmarked taxes (TL 436 billion in 1987; TL 645 billion estimated in 1988) and provides mortgage finance for moderate and low income households.

The Mass Housing Fund is the second largest of some sixty extra-budgetary funds (EBFs) which have been established in recent years to channel resources into high priority investments. The largest EBF, the Public Participation Fund which finances priority infrastructure, is also managed by TKF.

The MHF provides two basic services: (a) it supplies fixed interest rate, fifteen-year mortgages for up to US\$5000, an average of 40% to 50% of house cost; and (b) it subsidizes home buyers to make the mortgages "affordable". Interest rates range from 15% to 45% for higher income borrowers (see Appendix IV for more details).

It also provides lending to municipalities for land purchases and housing related expenditures, including community facilities such as schools and health centers), municipal infrastructive investments (utility works, roads, sewerage, stormwater drainage, power and telecommunications), and tourism development. Envisaged to work through the existing banking system, it operates out of a headquarters complex in Ankara.

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Function of MHF

The MHF is presently the single major institution providing long term housing finance, offering subsidized credit for housing construction and purchase. It is developing its own housing projects and also makes credit available for on-site infrastructure, land expropriation and credit to building material producers.

Revenue Sources

The major revenue sources for the Mass Housing Fund are presented in Table VI.1.

Table VI.1  
Mass Housing Fund Revenues  
1984 to '89  
(Million TL)

	Total 1984-87	Pct (%)	Estimated 1988	Pct (%)
1 Domestic Tobacco & Alcohol etc.	319,984.1	28.1	122,500.0	15.9
2 Fuel Oil Tax	304,651.4	26.7	136,500.0	17.7
3 Surcharge on Imports	186,529.9	16.4	98,000.0	12.7
4 MHF Fee on Custom Exempt Imports	16,127.5	1.4	8,400.0	1.1
5 Fees for Travel Abroad	68,204.2	6.0	31,500.0	4.1
6 Credit Repayments	81,474.5	5.4	125,000.0	16.2
7 Real Estate Sales to Foreigners	939.7	0.1	0.0	0.0
8 Imported Alcohol, Tobacco etc.	113,049.5	9.9	54,600.0	7.1
9 Late Fees for No. 5	1,270.4	0.1	350.0	0.0
10 Tax on Casino proceeds etc.	9,869.8	0.9	7,700.0	1.0
11 Interest on Treasury Bonds	15,267.2	1.3	7,000.0	0.9
12 Transfers for Interest Free Credit	34,176.0	3.0	67,000.0	8.7
13 Tax on Overland Transit Traffic	201.8	0.0	420.0	0.1
14 Tax on Electricity Consumption	0.0	0.0	0.0	0.0
15 Shares of Treasury-Owned Property	0.0	0.0	3,500.0	0.5
16 Interest Income	5,070.3	0.4	3,500.0	0.5
17 Sales of MHF-owned Real Estate	3,092.6	0.3	0.0	0.0
18 Sales of MHF-developed Housing	0.0	0.0	100,000.0	13.0
19 Transfers from other Funds	0.0	0.0	0.0	0.0
Carryover from Previous Year			4827.8	0.6
<b>TOTAL</b>	<b>1,139,909.6</b>	<b>100.0</b>	<b>770,797.8</b>	<b>100.0</b>

-Source: MHF

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Over the 1984-87 period, the four largest sources accounted for nearly 80% of total revenues, taxes on tobacco, domestic and imported alcohol, fuel oil and charges on imports. In 1988, credit repayments which only began in 1987, are expected to contribute a larger share to total revenues. However, under the current program of highly subsidized interest rates on credit, the real value of this source of revenue will not be maintained, limiting its ability to serve as self-sustaining source of revenue for the fund.

MHF Expenditures

Table VI.2 summarizes MHF expenditures over 1984 to 1988. During the 1984-87 period, nearly 88% of expenditures comprised housing credit to co-ops, to individuals, or supplemental credit available at 50% and 90% completion. In 1988, these credits are expected to comprise 70% of total expenditures with increases in credit extended for expropriation and infrastructure provision. Interest free credit to eligible civil servants which is administered by MHF but funded through SSK, is expected to increase from under 3% over the 84-87 period to nearly 9% of total expenditures.

Mass Housing Fund Expenditures  
1984 to 1988  
(Million TL)

	Total 1984-87	Pct (%)	Estimated 1988	Pct (%)	Actual to 7/31/88	Pct (%)
1 Cooperative Credit	690,809.1	61.2	469,097.8	60.9	166,405.6	47.5
2 Supplementary Credits	147,702.6	13.1			39,288.2	11.2
3 Individual Credit	152,500.0	13.5	75,000.0	9.7	48,473.7	13.8
4 MHF Expropriation/Infrastructure	25,109.6	2.2	100,000.0	13.0	52,922.6	15.1
5 Tourism Infrastructure	10,898.5	1.0	5,000.0	0.6	0.0	0.0
6 Investment Operating Credit	7,377.5	0.7	15,000.0	1.9	3,475.5	1.0
7 Transfers to Support/Devel. Fund	35,000.0	3.1	10,000.0	1.3	0.0	0.0
8 Loans to Survivors of Martyred Police	1,500.0	0.1	500.0	0.1	0.0	0.0
9 Interest-free Credit Payments	29,318.4	2.6	67,000.0	8.7	13,816.1	3.9
10 Transfers to Administrative Budget	11,770.0	1.0	7,000.0	0.9	4,000.0	1.1
11 Housing Program for W. German Workers	300.0	0.0	1,000.0	0.1	1,000.0	0.3
12 Disaster Housing	3,000.0	0.3	1,000.0	0.1	0.0	0.0
13 Interest Free Credit Repmts to SSK	12.6	0.0	250.0	0.0	112.3	0.0
14 Transfers to Other Funds	13,279.6	1.2	5,000.0	0.6	21,000.0	6.0
15 Other	328.8	0.0	14,950.0	1.9	0.0	0.0
<b>Total</b>	<b>1,128,906.7</b>	<b>100.0</b>	<b>770,797.8</b>	<b>100.0</b>	<b>350,494.0</b>	<b>100.0</b>

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Housing Credit Program

The MHF's major function is administering management of a program offering credit for construction and/or purchase of a newly constructed residential dwellings to both building cooperatives and to individuals.

Coop Credit

At the time of its original formation, nearly 200,000 units were under construction by building cooperatives, many of them previously financed through the EKB, the government's housing finance bank. The MHF took over the function as the major source of finance for co-op construction. Credit is made available to co-ops when construction reaches ground level at about 10 percent completion; this portion is financed wholly through co-op members' resources. Credit disbursement then continues over the remaining construction period.

While continuing to finance cooperative units begun prior to 1985, MHF has extended credit to 321,000 new co-op units as well. From 1984 through August 1988, approximately 160,000 co-op units had been completed and about 340,000 were still under construction.

Availability and Conditions of Credit

Upon its formation in 1984, the amount of credit offered by the MHF was proportional to the size of the unit to be built, ranging from 1.750 mil TL (\$4,772) for a unit less than 60M2 to 3.250 mil TL (\$8,865) for a unit between 101 and 150M2. Rates of interest also varied from 15% to 20%, as did the term of loan, depending on the size of the unit and its location, in or outside of designated mass housing areas.

At that time, a typical 100M2 unit in Ankara cost minimum 4.275 million TL, with land provided at very low cost by the municipality.

With credit of 3.250 mil TL, a 25% down payment was required.

As construction costs and interest rates rose, the MHF increased nominal units of credit available and raised interest rates. In April 1985, an additional 500,000 TL (\$950) of credit was made available at 50% completion on the same terms as the basic loan.

In 1986, the basic credit amount was increased and ranged from 2.25 mil TL (\$3,335) at 15% for 15 years to 3.5 mil at 22% for 10 years (for units 100 to 150M2). Either 500,000 TL or 1.0 mil TL (\$740 or \$1,481) in supplemental credit could be secured at 50% completion.

In 1987, the basic credit amount ranged from 3.0 mil TL (\$4,500) to 3.75 mil TL (\$4,375) for 15 years and 1.0 mil TL (\$166) was available at 50% completion.

#### Present Credit Terms

In 1988, to encourage the construction of smaller units and better target the subsidy the basic credit unit was set at 4.5 mil TL (\$3,332) for all size units, with the interest rate varying from 15 percent to 25 percent (Table VI.3). In addition to 1.0 mil. TL credit (\$740) at 50 percent completion another 1.0 mil TL of "Completion Credit" was made available (at the same terms) when a unit reached 90 percent completion.

Basic construction credit and supplementary credit at 50 percent and/or 90 percent completion is capitalized over the construction period. The supplementary credit is capitalized at a higher rate (now 40%) and the upon completion the principal and capitalized interest are repayable at the interest rate associated with the basic credit over 15 years.

Table VI.3  
MHF Mortgage Terms and Interest

Unit Size (m <sup>2</sup> )	Basic Credit Limit (TL)	Interest Rate (%)	Term (Yrs)	Customer Share Acct. (TL)
to 60m <sup>2</sup>	4,500,000	15	15	300,000
61-80m <sup>2</sup>	4,500,000	17	15	300,000
80-100m <sup>2</sup>	4,500,000	20	15	300,000
101-150m <sup>2</sup>	4,500,000	25	15	300,000

Source: MHF

Individual Credit is available at the same rate as for coop credit. It may be used either for construction or for purchase of a newly built home from a developer or other party. Rather than meeting the 10 percent completion requirement before disbursement of construction credit, the individual must maintain a non-interest bearing customer share account with a participating bank. The size of the account varies with the size of unit to be purchased. For units located within a mass housing area, the account must be maintained for six months, with other units for one year.

Proportion of Costs Covered with MHF Credit

Recent estimates of housing costs and comparison to credit available indicate that on units MHF was able to finance, less than 40 percent of construction costs can be covered by credit. The remaining 60 percent to must be met from personal financial resources. As of August 1988 the minimum cost for the average 100M2 unit was 17.5 million TL/M2).

Assuming a total of credit of 6.5 mil TL is obtained from MHF sources

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(4.5 mil TL basic credit and 2.0 mil TL in supplemental credit) and an additional 1.0 mil TL is obtained from SSK through MHF, the remaining 10 mil TL in cost (57 percent) could be considered the down payment.

This includes only the cost of construction. The inclusion of land and infrastructure costs increase further the percentage of total costs to be met with the buyer's personal resources. Any assistance program to aid the homebuyer must increase the proportion of cost covered through credit.

#### Types of Units Financed

As shown in Table VI.4, nearly 60 percent of the units financed by the MHF were in the range of 81 to 100M2. The relatively large size 100M2 unit has been described as the "preferred" housing size in Turkey. It is larger than the typical apartment units found in Europe and by most world standards would not be considered "low-income" housing.

Despite incentives in the form of lower interest rates by the MHF to encourage construction of smaller size units, the inability to limit credit to those truly in need has led to construction of units of a larger than optimal size.

As the costs of housing rise, it is essential that the "preferences" of homebuyers be considered only after evaluation of true housing need. In the absence of a means of successfully qualifying potential purchasers on the basis of income, the size of unit becomes the principal means through which housing subsidies can be targeted.

Increases in housing construction for investment purposes and purchases of second (vacation) homes utilizing MHF credit are evidence

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of the lack of success of previous efforts at targeting. By limiting any subsidy to units below some maximum size, say 70M2, efforts to discourage application by those who can afford and "need" a large unit have higher chance of success.

Table VI.4  
Units Receiving MHF Housing Credit, by Housing Size

Unit Size	No. of Units	Percent
Under 60m <sup>2</sup>	5,392	0.9
61-80m <sup>2</sup>	47,327	7.9
81-100m <sup>2</sup>	357,049	59.6
101-150m <sup>2</sup>	189,308	31.6
Total	599,076	100.0

MHF Housing Commitments and Completions

Over the 1984 to 1988 period, nearly 600,000 units have received credit from the MHF, approximately 43 percent of which have been completed. Of the units presently unfinished, 18 percent are cooperatives in existence prior to the creation of the MHF (Table VI.5).

Since the beginning of 1988, the MHF has had to delay disbursement of funds for construction. Conversations with co-op managers, bank and MHF officials familiar with procedures indicate that from 1984 until September 1987, the lag between completions of a portion of construction and credit disbursement averaged 2 or 3 weeks while more recently a 2-3 month wait was common and at one point even a 10-13 month delay was cited.

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Table VI.5  
Commitments and Completions of Units Receiving  
MHF Credit, by Type of Units

	Units for which Credit Committed (000)	(%)	Unfin- ished Units (000)	(%)	Percent Total Not Complete (%)
Old Cooperatives	187.6	31.3	64.4	18.3	34.3
New Cooperatives	253.1	42.2	222.9	63.2	88.1
Outside MHI Areas	67.5	11.3	57.3	16.2	84.8
Individual Housing Credit	82.4	13.8	0	0	0
MHF Developed Housing	8.1	1.4	8.1	2.3	100
Martyred Police Family Housing	.3	-	0	0	0
Total	599.1	100	352.7	100	58.9

Extensions to the three year period between initial credit disbursement and start of repayment are made when disbursements are delayed. Additional cost is incurred as interest continues to accrue over the prolonged construction period.

Resource Flows During Construction - Credit Disbursements

Once a project has met eligibility criteria for MHF credit, it becomes the responsibility of the Bank to review monitoring the technical and financial aspects of the project. The bank is authorized to extend a construction loan which normally becomes a long term mortgage upon completion of the unit. Separate applications are made for supplemental credit at 50 percent and/or 90 percent completion. The bank receives a commission of 2 percent, 1 percent at the time of disbursement and 1 percent at the time of repayment.

Typically, a request for disbursement is made to the local branch bank, by the co-op or builders. The project is inspected by the bank's representatives within several days before the request is approved.

Each week, the main bank office requests a disbursement from the MHF which remits the funds along with the 1 percent commission after some period. An EKB representative indicated in August that at that time the wait was 60 to 75 days although a few months earlier, it was 35 to 40 days. Once credited to the main bank office, funds are distributed to branch banks within two or three days for disbursement to the co-op or builder.

Upon completion of construction, the bank notifies MHF that the project is complete. The principal and accrued interest on the construction loan for a project are then converted to long term mortgages payable by the owners of the newly completed units.

Substantial delays occur at this point. Inefficient procedures in the Title Office prolong the period required to convert titles held by the co-op or developer to individual titles. In addition, owners sometimes move into the completed units, but neglect to request an occupancy permit in order to delay the start of mortgage repayments. The MHF is presently attempting to eliminate both sources of delay in beginning the repayment of credit.

#### Credit Repayment

When the repayment period begins, mortgage recipients are required to deposit their payments in the appropriate branch bank by the first of the month. This requirement, however, is not enforced and there is no penalty for late payment, although interest continues to accrue daily on

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the unpaid balance. The branch bank forwards the month's payments received to the main office by the 10th of the following month, the branch in turn forwards them to the MHF minus 1 percent commission.

#### Individual Credit Disbursement

The banks also handle the servicing of Customer Share Accounts for individuals who intend to use MHF credit. The MHF directs the Bank to authorize credit up to a given amount; the bank then accepts deposits in customer share accounts up to the level needed to exhaust the credit to be available from MHF.

An individual who has maintained a share account for the required period is eligible for credit immediately if he is purchasing a newly completed home. If he requires credit during construction, inspection, disbursement, and repayment procedures are the same as for co-ops.

#### Defaults

Because significant levels of repayment have only begun in the last year, it is difficult to generalize about default rates. However, as would be expected given the high level of subsidy, few borrowers repay loans early. Few defaults have occurred and the Konut Bank has tried to reschedule repayments in these cases. To set an example, three or four units have been repossessed. However, this process takes from six months to one year and sometimes even two years.

#### Problems

The MHF's reliance on agent banks and branches for much of the administration processing, supervision and disbursement of credit has enabled it to avoid duplication of services already available within the financial system. However, it could further tighten controls over agent

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bank operations, making them more accountable for the efficient return flow of repayments. The MHF fund is presently strengthening its information system to better enable it to determine the precise levels of repayments and disbursements. Control of the banks can further be strengthened by requiring them to submit and periodically update projections of repayment schedules by loan type.

SUMMARY OF MHF ACTIVITIES TO DATE

MHF's program has had a substantial impact. Since its creation it has provided financing for about 500,000 housing units. It has played an important part in the revival of the construction industry and related employment. Housing investment has grown to a level of about 3.5% to 4.0% of GDP, and MHF alone is financing housing valued at about 2% of GDP per year. The revival of housing construction and the availability of affordable mortgage terms has helped large numbers of urban households to gain access to home ownership. As a specially targeted counter cyclical program, it has helped to relieve some of the social pressure caused by the economic stabilization and adjustment program. Several problems can, however, be identified in the way the program has developed.

First, the program has become a large expense to government at a time when there is a need to reduce the government budget deficit and the public sector borrowing requirement. Recognizing this, the government has decided to transfer 30% of MHF's and most other EBF's 1988 revenues to general government revenue. The program, however, remains expensive, especially in view of the high current rates of inflation (50-60%), the low average lending rate (15-20%) and the problem of poor collections.

Second, the prohibition of the use of indexation for inflation on financial instruments in Turkey means that, if market interest rates were charged, the real cost of borrowing would be shifted to the early years of the loan. With the MHF, the high real cost of the initial

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payments has been eliminated through subsidies rather than by using a mortgage contract that adjusts repayments for inflation. In a sense, most of the MHF subsidy essentially pays for the absence of indexed contracts. It substitutes government expenditures for payments households could make, and given the rapid appreciation in real house prices, should be willing to make.

Third, there appear to be a number of problems with subsidy targeting. The MHF subsidy mechanism was developed quickly in a financially disrupted economy. It is not surprising that a number of problems are associated with it. For example, the level of subsidy (1) is not transparent or usually measured; (2) is dependent on the rate of inflation rather than a policy choice; (3) takes up too large a portion of the fund's expenditure on each loan; (4) is too broadly targeted so that many of those in need do not receive assistance and vice versa; (5) could be much more effectively linked to infrastructure provision; (6) requires far too long a construction period for the units that receive the subsidies; and (7) takes up a large amount of the MHF disbursement per unit but accounts for only a small amount of housing costs.

Adjustment of the subsidy distribution mechanism would yield high returns. The provision of poorly targeted subsidies by MHF on such a large scale is creating high expectations about the level and terms of assistance that the government can provide to homebuyers. It is likely to be difficult to meet and continue to satisfy these expectations over the long term without creating broader problems for the economy. The countercyclical stimulus that the fund once provided may now be excessive. As much as 40 percent of private fixed capital formation is

now in housing at a time when inflationary pressures have been increasing.

Fourth, the availability of large amounts of credit at negative real interest rates may be distorting the use of real resources. More analysis is required, but it appears that land use, infrastructure and housing standards in recent projects may have been over designed with the anticipation of subsidized credit to make the housing units affordable. More appropriate standards may be required in conjunction with more realistically priced credit.

Finally, there appear to be serious financial management problems to MHF. Beyond the senior staff level, the understanding in MHF of the effects of inflation on the value of loan repayments is limited. Moreover, MHF's financial condition is not clear. There is, for example, poor documentation of the amounts MHF has disbursed, so it is uncertain of the amounts owed by households. The practices of Emlak Bank, which acts as agent for disbursement and collection of most of MHF's loans, appear to be in similar condition. There is an urgent need to establish sound financial practices at the MHF.

## Appendix VII

### THE MHF MORTGAGE REPAYMENT SIMULATION MODEL

#### What the Model Is

Is an indexed mortgage scheme workable when high inflation rates prevail in the economy? What will happen to the outstanding balance of a typical loan if payments are pegged to real wages and real wages are bobbing up and down with inflation? What is the maximum size unit a family with a monthly household income of 230,000 TL can afford? If the outstanding balance of the loan is forgiven by the Turkish Government after twenty years, what level of subsidy will result? What is the effect on the amount of the loan of shortening or lengthening the period of construction? How will higher construction costs per square meter influence the unit size and loan size affordable by a certain income group? And, how will varying the proportion of family income committed to monthly payments hasten or slow the repayment of the loan? These are some of the many scenarios that can be examined with the Mortgage Repayment Simulation Model.

In simple terms, the model is a spreadsheet that takes information that is supplied by the user on basic characteristics of the loan and the borrower, and calculates a monthly amortization table for a period of up to twenty years. The model helps to "visualize" what the payments look like over the life of the loan, and to assess how realistic an indexed loan scheme is for different income groups when certain costs or economic conditions are assumed to apply.

From the perspective of the Mass Housing Fund, the model can be particularly useful in setting its lending policy. It could provide a basis for, say, determining appropriate eligibility limits on unit sizes affordable for various income classes. Another advantage is the ability of the model to help the Fund predict the real value of its revenues and to plan for foregone payments if persistent inflation results in the forgiveness of large numbers of loans after a period of twenty years.

#### An Overview

As shown in the Program Map presented in Figure 1, the model consists of four major components, the first two of which require some initial data from the user:

1. **Main Input Variables.** This is where the basic details of the case study are spelled out. The user fills in the size of the unit, the assumed cost per square meter of constructing the unit, the amount of the outright subsidy or grant, if any, the loan-to-value ratio, the assumed household monthly income -- and the proportion of that income that is to be put towards the monthly mortgage payments--and, finally, the length of time (in months) over which construction occurs and the rate at which interest on the loan is accruing over that same period.
2. **Specification of Rates.** The model makes calculations for a repayment period of twenty years. For each of these years, the user specifies a number of assumptions. The first of these is the rate of inflation that is expected to prevail each year. Next, and of particular importance, is the rate at which real wages change relative to inflation. If, for instance, one wanted to see the effect of a zero increase in real wages, 100 percent would be entered to indicate that

wages were keeping even with inflation. Actual historical data was entered here for some simulations (as discussed in the main text) to test what would happen if future wages were to behave as they have in the past.

In this section of the model, as well, the user indicates the nominal and real interest rates at which the Fund is making the loan.

**3. Loan Recovery.** No inputs are required for this sector of the model which summarizes the loan repayment information from the amortization table appearing directly below it. It tells, at a glance, how many months were required to pay the loan off and in which month the peak loan amount occurred. If, in fact, the loan never amortized, the Loan Repayment Period indicated would be 240 (the last month of the twenty year period) and a calculation of the subsidy implied with forgiveness of the balance is made. Note that this subsidy is expressed both as the present value of the outstanding amount and as a percentage of the original loan amount.

**4. Monthly Amortization Table.** This portion of the model shows the monthly arithmetic of the loan repayment period. It indicates the beginning and ending monthly balances, the amount of unpaid monthly interest that is capitalized and the real value of the monthly payments.

The initial loan balance is drawn from the first component of the program (where the loan size, the interest accrued, and the length of the construction period are all indicated). Monthly payments are based on the household income level and proportion put toward the payments. These also are taken from the inputs in the first component of the program. Yearly increases in income reflect the rate at which wages

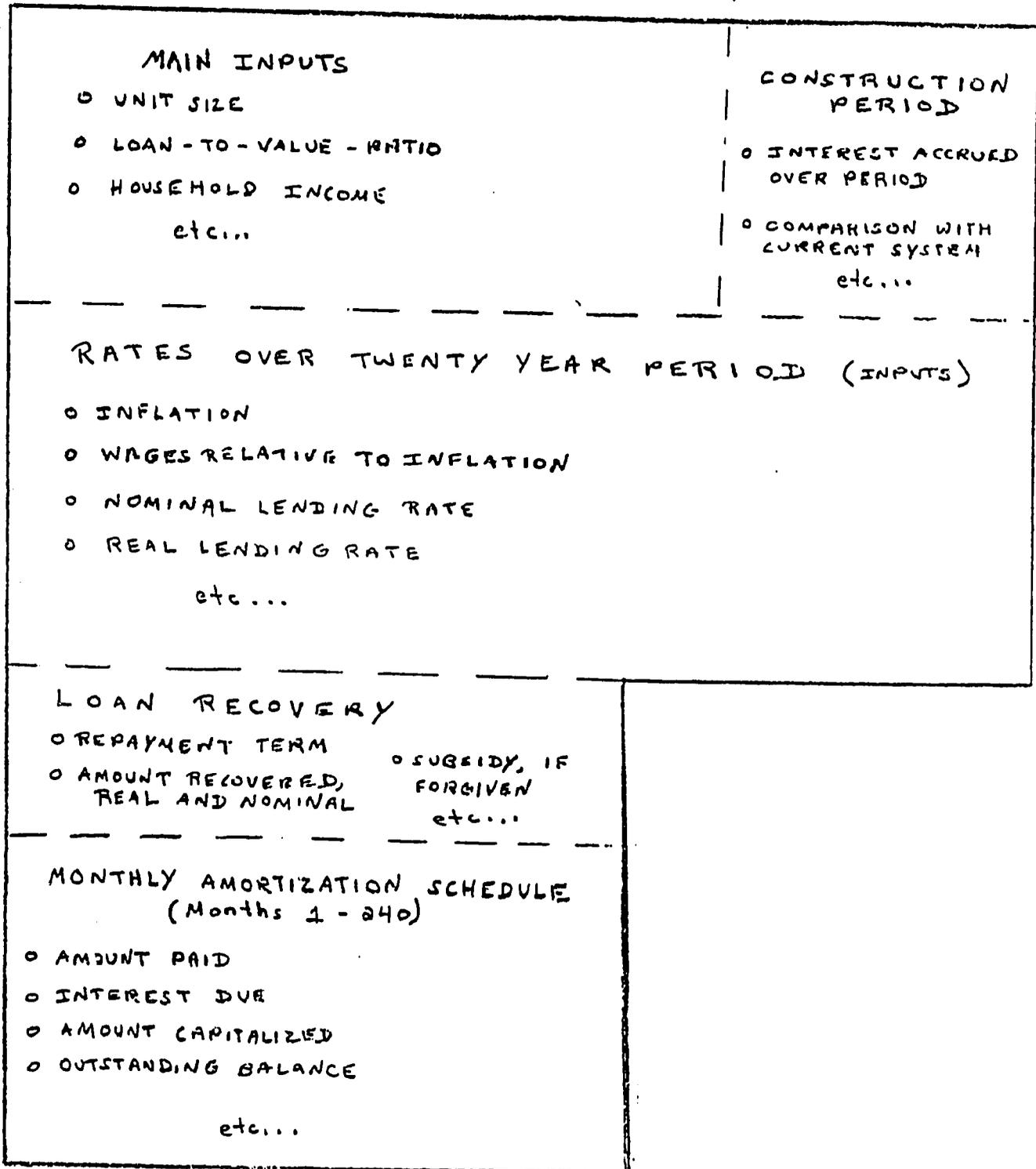
keep pace with inflation as entered in component two. Thus, from all these original assumptions, monthly calculations are made.

An actual printout of a model simulation is reproduced below in full as is some additional documentation of the model calculations.

# MASS HOUSING FUND (MHF)

## LOAN REPAYMENT MODEL

### PROGRAM MAP



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Turkey  
Mass Housing Fund  
Proposed Loan Repayment Model

Mortgage Analysis for urbanized lot and 70 m2 unit  
-----

Cost/m2 230 000 TL  
Unit cost 16,100 000 TL  
-subsidy 0 000 TL

16100 000 TL equals 22 Mthly MH

-----  
Act. cost 16,100 000 TL

L/V ratio 75%

Ref rate: 25% (prop of income for first pmt )  
annual % decrease in ref rte 0%

-----  
Loan amt: 12075 000 TL

Mthly. hshld inc. 733 000 TL

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CONSTRUCTION LOAN

interest	0.38
loan am't	670,833.33 (equal dsbr)
term (Mths)	18
value	15,945,491.10

		1988	1989	1990	1991	1992	1993	1994	1995
	Yrly.avge	0	1	2	3	4	5	6	7
Inflation	30% !	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Price Index	!	100.0	130.0	169.0	219.7	285.6	371.3	482.7	627.5
Min Wge Incr as % of Infla		108.0%	86.0%	70.0%	147.0%	114.0%	111.0%	128.0%	15.6%
Min. Wage % Incr.	!		32.4%	25.8%	21.0%	44.1%	34.2%	33.3%	38.4%
Min. Wage (000 TL/yr)	!	8,796	11646	14651	17727	25545	34281	45697	63244
% Int MHF Could Pay Savers:									
Nominal	!	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%
Real	!	4%	4%	4%	4%	4%	4%	4%	4%
MHF's Add-on Rate	!	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
MHF's. Lending Rte:									
Nominal	!	38.0%	38.0%	38.0%	38.0%	38.0%	38.0%	38.0%	38.0%
Real	!	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%
Benef. Incme (000 TL/yr)	!		8,796	11,065	13,389	19,294	25,892	34,514	47,768
Pmt. as % of incme	!		25%	26%	27%	23%	25%	25%	24%
Loan Outstanding: (000 TL)									
-- nominal	!		15,945	19,445	23,445	28,091	33,606	38,943	43,764
-- real	!		15,945	14,958	13,873	12,786	11,766	10,488	9,067

MHF Proposed Loan													
1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
7	8	9	10	11	12	13	14	15	16	17	18	19	20
30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
627.5	815.7	1060.4	1378.6	1792.2	2329.8	3028.8	3937.4	5118.6	6654.2	8650.4	11245.5	14619.2	19005.0
15.6%	55.8%	58.8%	102.0%	148.4%	112.3%	104.8%	128.1%	71.4%	146.0%	89.6%	156.0%	124.8%	124.8
38.4%	4.7%	16.7%	17.6%	30.6%	44.5%	33.7%	31.4%	38.4%	21.4%	43.8%	26.9%	46.8%	37.4
63244	66204	77287	90920	118742	171606	229420	301549	417434	506849	728849	924763	1357552	1865820
35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0%	35.0
4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	4
3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0
38.0%	38.0%	38.0%	38.0%	38.0%	38.0%	38.0%	38.0%	38.0%	38.0%	38.0%	38.0%	38.0%	38.0
6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2%	6.2
47,768	50,003	58,374	68,671	89,684	129,611	173,278	227,756	315,283	382,816	550,490	698,462	1,025,342	1,409,229
24%	32%	28%	28%	25%	23%	25%	0%	0%	0%	0%	0%	0%	0%
43,764	47,097	46,588	45,026	39,644	28,249	4,428	0	0	0	0	0	0	0
9,067	7,506	5,711	4,246	2,876	1,576	190	0	0	0	0	0	0	0

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		38% (nminl)	6% (real)	SUBSIDY	If Forgiven - 2
Rate of ret (annualized)...					
Loan repayment period .....		146 months			
Peak loan amount .....		47,097 000 TL		Const. Per	0
Month with peak loan amt....		84 th month		Repay Per	0
Total amt. recovered:				PV Bal	0
In current terms ...	148,260 000 TL			Other Subsidy	0
In real tererms ...	22,124 000 TL			-----	
				Total	0
Real amt rcvrd as % of loan ...	139%			% Orig. Loan	0.00%

MONTHLY AMORTIZATION SCHEDULE FOR urbanized lot and 70 m2 unit									
Month	Mthly Min Wge	Intr rate chgd mthly	Bgn of month amount outstdg.	Mthly inter pymnt due	Mthly pymnt made	Unpd amnt to be cptlzd	End of month amount outstdg.	Pymnt as a prop of MW	Pymnt as prop of fmlly income
	(TL)	(%)	(TL)	(TL)	(TL)	(TL)	(TL)		(%)
0	733,000	0	15,945,491		0 (15,945,491)	0	15,945,491	0	0
1	733,000	2.72%	15,945,491	433,777	183,250	250,527	16,196,018	0.25	25%
2	733,000	2.72%	16,196,018	440,592	183,250	257,342	16,453,360	0.25	25%
3	733,000	2.72%	16,453,360	447,593	183,250	264,343	16,717,703	0.25	25%
4	733,000	2.72%	16,717,703	454,784	183,250	271,534	16,989,237	0.25	25%
5	733,000	2.72%	16,989,237	462,171	183,250	278,921	17,268,158	0.25	25%
6	733,000	2.72%	17,268,158	469,758	183,250	286,508	17,554,666	0.25	25%
7	733,000	2.72%	17,554,666	477,553	183,250	294,303	17,848,969	0.25	25%
8	733,000	2.72%	17,848,969	485,559	183,250	302,309	18,151,277	0.25	25%
9	733,000	2.72%	18,151,277	493,783	183,250	310,533	18,461,810	0.25	25%
10	733,000	2.72%	18,461,810	502,230	183,250	318,980	18,780,790	0.25	25%
11	733,000	2.72%	18,780,790	510,908	183,250	327,658	19,108,448	0.25	25%
12	733,000	2.72%	19,108,448	519,821	183,250	336,571	19,445,019	0.25	25%
13	970,492	2.72%	19,445,019	528,977	242,623	286,354	19,731,373	0.25	26%
14	970,492	2.72%	19,731,373	536,767	242,623	294,144	20,025,517	0.25	26%
15	970,492	2.72%	20,025,517	544,769	242,623	302,146	20,327,663	0.25	26%
16	970,492	2.72%	20,327,663	552,988	242,623	310,365	20,638,029	0.25	26%
17	970,492	2.72%	20,638,029	561,431	242,623	318,808	20,956,837	0.25	26%
18	970,492	2.72%	20,956,837	570,104	242,623	327,481	21,284,318	0.25	26%
19	970,492	2.72%	21,284,318	579,013	242,623	336,390	21,620,708	0.25	26%
20	970,492	2.72%	21,620,708	588,164	242,623	345,541	21,966,249	0.25	26%
21	970,492	2.72%	21,966,249	597,564	242,623	354,941	22,321,190	0.25	26%
22	970,492	2.72%	22,321,190	607,220	242,623	364,597	22,685,787	0.25	26%
23	970,492	2.72%	22,685,787	617,138	242,623	374,515	23,060,302	0.25	26%
24	970,492	2.72%	23,060,302	627,326	242,623	384,703	23,445,006	0.25	26%
25	1,220,879	2.72%	23,445,006	637,792	305,220	332,572	23,777,578	0.25	27%
26	1,220,879	2.72%	23,777,578	646,839	305,220	341,619	24,119,197	0.25	27%
27	1,220,879	2.72%	24,119,197	656,132	305,220	350,913	24,470,110	0.25	27%
28	1,220,879	2.72%	24,470,110	665,678	305,220	360,459	24,830,568	0.25	27%
29	1,220,879	2.72%	24,830,568	675,484	305,220	370,265	25,200,833	0.25	27%
30	1,220,879	2.72%	25,200,833	685,557	305,220	380,337	25,581,170	0.25	27%
31	1,220,879	2.72%	25,581,170	695,903	305,220	390,684	25,971,854	0.25	27%
32	1,220,879	2.72%	25,971,854	706,531	305,220	401,312	26,373,165	0.25	27%
33	1,220,879	2.72%	26,373,165	717,449	305,220	412,229	26,785,394	0.25	27%
34	1,220,879	2.72%	26,785,394	728,663	305,220	423,443	27,208,837	0.25	27%
35	1,220,879	2.72%	27,208,837	740,182	305,220	434,962	27,643,800	0.25	27%
36	1,220,879	2.72%	27,643,800	752,015	305,220	446,795	28,090,595	0.25	27%
37	1,477,264	2.72%	28,090,595	764,169	369,316	394,853	28,485,448	0.25	23%
38	1,477,264	2.72%	28,485,448	774,911	369,316	405,595	28,891,043	0.25	23%
39	1,477,264	2.72%	28,891,043	785,944	369,316	416,628	29,307,671	0.25	23%
40	1,477,264	2.72%	29,307,671	797,278	369,316	427,962	29,735,633	0.25	23%
41	1,477,264	2.72%	29,735,633	808,920	369,316	439,604	30,175,238	0.25	23%
42	1,477,264	2.72%	30,175,238	820,879	369,316	451,563	30,626,801	0.25	23%
43	1,477,264	2.72%	30,626,801	833,163	369,316	463,848	31,090,649	0.25	23%
44	1,477,264	2.72%	31,090,649	845,782	369,316	476,466	31,567,115	0.25	23%
45	1,477,264	2.72%	31,567,115	858,743	369,316	489,428	32,056,542	0.25	23%
46	1,477,264	2.72%	32,056,542	872,059	369,316	502,742	32,550,284	0.25	23%

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49	2,128,737	2.72%	33,606,169	914,213	532,184	382,029	33,988,198	0.25	25%
50	2,128,737	2.72%	33,988,198	924,606	532,184	392,422	34,380,620	0.25	25%
51	2,128,737	2.72%	34,380,620	935,281	532,184	403,097	34,783,717	0.25	25%
52	2,128,737	2.72%	34,783,717	946,247	532,184	414,063	35,197,780	0.25	25%
53	2,128,737	2.72%	35,197,780	957,511	532,184	425,327	35,623,107	0.25	25%
54	2,128,737	2.72%	35,623,107	969,082	532,184	436,897	36,060,005	0.25	25%
55	2,128,737	2.72%	36,060,005	980,967	532,184	448,783	36,508,787	0.25	25%
56	2,128,737	2.72%	36,508,787	993,175	532,184	460,991	36,969,779	0.25	25%
57	2,128,737	2.72%	36,969,779	1,005,716	532,184	473,532	37,443,310	0.25	25%
58	2,128,737	2.72%	37,443,310	1,018,598	532,184	486,414	37,929,724	0.25	25%
59	2,128,737	2.72%	37,929,724	1,031,830	532,184	499,646	38,429,370	0.25	25%
60	2,128,737	2.72%	38,429,370	----- 1,045,422	532,184	513,238	38,942,609	0.25	25%
61	2,856,765	2.72%	38,942,609	1,059,384	714,191	345,193	39,287,802	0.25	25%
62	2,856,765	2.72%	39,287,802	1,068,775	714,191	354,584	39,642,386	0.25	25%
63	2,856,765	2.72%	39,642,386	1,078,421	714,191	364,230	40,006,616	0.25	25%
64	2,856,765	2.72%	40,006,616	1,088,329	714,191	374,138	40,380,754	0.25	25%
65	2,856,765	2.72%	40,380,754	1,098,507	714,191	384,316	40,765,070	0.25	25%
66	2,856,765	2.72%	40,765,070	1,108,962	714,191	394,771	41,159,841	0.25	25%
67	2,856,765	2.72%	41,159,841	1,119,701	714,191	405,510	41,565,351	0.25	25%
68	2,856,765	2.72%	41,565,351	1,130,733	714,191	416,542	41,981,893	0.25	25%
69	2,856,765	2.72%	41,981,893	1,142,064	714,191	427,873	42,409,766	0.25	25%
70	2,856,765	2.72%	42,409,766	1,153,704	714,191	439,513	42,849,279	0.25	25%
71	2,856,765	2.72%	42,849,279	1,165,661	714,191	451,469	43,300,749	0.25	25%
72	2,856,765	2.72%	43,300,749	----- 1,177,942	714,191	463,751	43,764,500	0.25	25%
73	3,808,067	2.72%	43,764,500	1,190,558	952,017	238,541	44,003,041	0.25	24%
74	3,808,067	2.72%	44,003,041	1,197,047	952,017	245,030	44,248,071	0.25	24%
75	3,808,067	2.72%	44,248,071	1,203,713	952,017	251,696	44,499,767	0.25	24%
76	3,808,067	2.72%	44,499,767	1,210,560	952,017	258,543	44,758,310	0.25	24%
77	3,808,067	2.72%	44,758,310	1,217,593	952,017	265,576	45,023,887	0.25	24%
78	3,808,067	2.72%	45,023,887	1,224,818	952,017	272,801	45,296,688	0.25	24%
79	3,808,067	2.72%	45,296,688	1,232,239	952,017	280,222	45,576,910	0.25	24%
80	3,808,067	2.72%	45,576,910	1,239,862	952,017	287,845	45,864,755	0.25	24%
81	3,808,067	2.72%	45,864,755	1,247,693	952,017	295,676	46,160,431	0.25	24%
82	3,808,067	2.72%	46,160,431	1,255,736	952,017	303,719	46,464,151	0.25	24%
83	3,808,067	2.72%	46,464,151	1,263,999	952,017	311,982	46,776,132	0.25	24%
84	3,808,067	2.72%	46,776,132	----- 1,272,486	952,017	320,469	47,096,601	0.25	24%
85	5,270,365	2.72%	47,096,601	1,281,204	1,317,591	(36,388)	47,060,213	0.25	32%
86	5,270,365	2.72%	47,060,213	1,280,214	1,317,591	(37,278)	47,022,836	0.25	32%
87	5,270,365	2.72%	47,022,836	1,279,197	1,317,591	(38,394)	46,984,441	0.25	32%
88	5,270,365	2.72%	46,984,441	1,278,152	1,317,591	(39,439)	46,945,002	0.25	32%
89	5,270,365	2.72%	46,945,002	1,277,079	1,317,591	(40,512)	46,904,491	0.25	32%
90	5,270,365	2.72%	46,904,491	1,275,977	1,317,591	(41,614)	46,862,877	0.25	32%
91	5,270,365	2.72%	46,862,877	1,274,845	1,317,591	(42,746)	46,820,131	0.25	32%
92	5,270,365	2.72%	46,820,131	1,273,683	1,317,591	(43,909)	46,776,222	0.25	32%
93	5,270,365	2.72%	46,776,222	1,272,488	1,317,591	(45,103)	46,731,119	0.25	32%
94	5,270,365	2.72%	46,731,119	1,271,261	1,317,591	(46,330)	46,684,788	0.25	32%
95	5,270,365	2.72%	46,684,788	1,270,001	1,317,591	(47,591)	46,637,198	0.25	32%
96	5,270,365	2.72%	46,637,198	----- 1,268,706	1,317,591	(48,885)	46,588,313	0.25	32%
97	5,517,018	2.72%	46,588,313	1,267,376	1,379,255	(111,878)	46,476,434	0.25	28%
98	5,517,018	2.72%	46,476,434	1,264,333	1,379,255	(114,922)	46,361,512	0.25	28%
99	5,517,018	2.72%	46,361,512	1,261,206	1,379,255	(118,048)	46,243,464	0.25	28%
100	5,517,018	2.72%	46,243,464	1,257,995	1,379,255	(121,260)	46,122,205	0.25	28%
101	5,517,018	2.72%	46,122,205	1,254,696	1,379,255	(124,558)	45,997,646	0.25	26%
102	5,517,018	2.72%	45,997,646	1,251,308	1,379,255	(127,947)	45,869,700	0.25	26%

105	5,517,018	2.72%	45,805,210	1,240,579	1,379,255	(138,675)	45,464,594	0.25	28%
106	5,517,018	2.72%	45,464,594	1,236,807	1,379,255	(142,448)	45,322,147	0.25	28%
107	5,517,018	2.72%	45,322,147	1,232,932	1,379,255	(146,323)	45,175,824	0.25	28%
108	5,517,018	2.72%	45,175,824	----- 1,228,951	1,379,255	(150,303)	45,025,520	0.25	28%
109	6,440,567	2.72%	45,025,520	1,224,862	1,610,142	(385,279)	44,640,241	0.25	28%
110	6,440,567	2.72%	44,640,241	1,214,381	1,610,142	(395,760)	44,244,481	0.25	28%
111	6,440,567	2.72%	44,244,481	1,203,615	1,610,142	(406,527)	43,837,954	0.25	28%
112	6,440,567	2.72%	43,837,954	1,192,556	1,610,142	(417,586)	43,420,368	0.25	28%
113	6,440,567	2.72%	43,420,368	1,181,196	1,610,142	(428,946)	42,991,423	0.25	28%
114	6,440,567	2.72%	42,991,423	1,169,527	1,610,142	(440,614)	42,550,808	0.25	28%
115	6,440,567	2.72%	42,550,808	1,157,541	1,610,142	(452,601)	42,098,208	0.25	28%
116	6,440,567	2.72%	42,098,208	1,145,229	1,610,142	(464,913)	41,633,294	0.25	28%
117	6,440,567	2.72%	41,633,294	1,132,581	1,610,142	(477,561)	41,155,734	0.25	28%
118	6,440,567	2.72%	41,155,734	1,119,590	1,610,142	(490,552)	40,665,182	0.25	28%
119	6,440,567	2.72%	40,665,182	1,106,245	1,610,142	(503,897)	40,161,285	0.25	28%
120	6,440,567	2.72%	40,161,285	----- 1,092,537	1,610,142	(517,605)	39,643,680	0.25	28%
121	7,576,683	2.72%	39,643,680	1,078,456	1,894,171	(815,715)	38,827,966	0.25	25%
122	7,576,683	2.72%	38,827,966	1,056,266	1,894,171	(837,905)	37,990,061	0.25	25%
123	7,576,683	2.72%	37,990,061	1,033,472	1,894,171	(860,699)	37,129,361	0.25	25%
124	7,576,683	2.72%	37,129,361	1,010,057	1,894,171	(884,113)	36,245,248	0.25	25%
125	7,576,683	2.72%	36,245,248	986,006	1,894,171	(908,165)	35,337,083	0.25	25%
126	7,576,683	2.72%	35,337,083	961,301	1,894,171	(932,870)	34,404,213	0.25	25%
127	7,576,683	2.72%	34,404,213	935,923	1,894,171	(958,248)	33,445,966	0.25	25%
128	7,576,683	2.72%	33,445,966	909,855	1,894,171	(984,316)	32,461,650	0.25	25%
129	7,576,683	2.72%	32,461,650	883,078	1,894,171	(1,011,093)	31,450,558	0.25	25%
130	7,576,683	2.72%	31,450,558	855,573	1,894,171	(1,038,598)	30,411,959	0.25	25%
131	7,576,683	2.72%	30,411,959	827,319	1,894,171	(1,066,852)	29,345,108	0.25	25%
132	7,576,683	2.72%	29,345,108	----- 798,297	1,894,171	(1,095,874)	28,249,233	0.25	25%
133	9,895,148	2.72%	28,249,233	768,485	2,473,787	(1,705,302)	26,543,931	0.25	23%
134	9,895,148	2.72%	26,543,931	722,094	2,473,787	(1,751,693)	24,792,238	0.25	23%
135	9,895,148	2.72%	24,792,238	674,442	2,473,787	(1,799,346)	22,992,893	0.25	23%
136	9,895,148	2.72%	22,992,893	625,493	2,473,787	(1,848,294)	21,144,598	0.25	23%
137	9,895,148	2.72%	21,144,598	575,212	2,473,787	(1,898,575)	19,246,023	0.25	23%
138	9,895,148	2.72%	19,246,023	523,564	2,473,787	(1,950,223)	17,295,800	0.25	23%
139	9,895,148	2.72%	17,295,800	470,510	2,473,787	(2,003,277)	15,292,523	0.25	23%
140	9,895,148	2.72%	15,292,523	416,014	2,473,787	(2,057,773)	13,234,750	0.25	23%
141	9,895,148	2.72%	13,234,750	360,035	2,473,787	(2,113,752)	11,120,997	0.25	23%
142	9,895,148	2.72%	11,120,997	302,533	2,473,787	(2,171,254)	8,949,743	0.25	23%
143	9,895,148	2.72%	8,949,743	243,466	2,473,787	(2,230,321)	6,719,422	0.25	23%
144	9,895,148	2.72%	6,719,422	----- 182,793	2,473,787	(2,290,994)	4,428,429	0.25	23%
145	14,300,468	2.72%	4,428,429	120,470	3,575,117	(3,454,647)	973,782	0.25	25%
146	14,300,468	2.72%	973,782	26,490	1,000,272	(973,782)	0	0.07	7%
0	0	0.00%	0	0	0	0	0	0.00	0%

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Monthly Inflation %	Monthly Inflation Factor	Deflated Monthly Payments
		0 (15,945,491)
2.21%	0.9784	1 179,287
2.21%	0.9572	2 175,410
2.21%	0.9365	3 171,616
2.21%	0.9163	4 167,905
2.21%	0.8964	5 164,274
2.21%	0.8771	6 160,721
2.21%	0.8581	7 157,245
2.21%	0.8395	8 153,844
2.21%	0.8214	9 150,517
2.21%	0.8036	10 147,262
2.21%	0.7862	11 144,077
2.21%	0.7692	12 140,962
2.21%	0.7526	13 137,917
2.21%	0.7363	14 134,942
2.21%	0.7204	15 132,037
2.21%	0.7048	16 129,202
2.21%	0.6896	17 126,437
2.21%	0.6747	18 123,742
2.21%	0.6601	19 121,117
2.21%	0.6458	20 118,562
2.21%	0.6318	21 116,077
2.21%	0.6182	22 113,662
2.21%	0.6048	23 111,317
2.21%	0.5917	24 109,042
2.21%	0.5789	25 106,837
2.21%	0.5664	26 104,702
2.21%	0.5542	27 102,637
2.21%	0.5422	28 100,642
2.21%	0.5304	29 98,717
2.21%	0.5190	30 96,862
2.21%	0.5077	31 95,077
2.21%	0.4968	32 93,362
2.21%	0.4860	33 91,717
2.21%	0.4755	34 90,142
2.21%	0.4652	35 88,637
2.21%	0.4552	36 87,192

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MODEL CALCULATIONS

YRLY AVE. (inflation) -  $((\text{Price Index Yr. \#20} / \text{Price Index Yr. \#0})^{1/20}) - 1$ .

INFLATION - input by the user for each of the twenty years.

PRICE INDEX - input in Yr. #0; then calculated by:  
 $(\text{Previous Year's Index}) \times (1 + \text{This Year's Inflation Rate})$

MIN WAGE INCR AS % INFLA - input for each year; the percent change in real wages, added it to the inflation rate to get the total percentage increase in wages, and divided by the inflation rate to get the total increase as a percent of inflation.

MIN WAGE % INCR -  $(\text{Previous Year's inflation rate}) \times (\text{Previous Year's MIN WAGE INCR AS \% INFLA})$

MIN WAGE (OOO TL/yr) - input in Yr. #0; we used MNTLY HH INCOME input above multiplied by 12; thereafter, is calculated by model as:  
 $(\text{MIN WAGE for Previous Year}) \times (1 + \text{This Year's MIN WAGE \% INCR})$

NOM INT MHF COULD PAY SAVERS - input for each of the twenty years.

REAL " -  $(1 + \text{This Year's NOM INT RATE}) / (1 + \text{This Year's INFLATION rate}) - 1$   
and rounded

MHF'S ADD ON RATE - input for each of the twenty years.

MHF'S LENDING RATE:

NOMINAL -  $(\text{This Year's NOM INT MHF COULD PAY SAVERS}) + (\text{MHF'S ADD ON RATE})$

REAL -  $(1 + \text{This Year's NOMINAL MHF'S LENDING RATE}) / (1 + \text{This Year's INFLATION}) - 1$   
and rounded

BENEF INCOME PER YR - for Year #1, (MONTHLY INCOME input) x 12;  
thereafter,  $(\text{Previous Year's BENEF INCOME}) \times (1 + \text{This Year's MIN WAGE \% INCR})$

PMT AS % OF INCOME - taken from PAYMENT AS PROP OF FMLY INCOME column in monthly amortization table below; uses first month of each year #1, #13, #25;

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LOAN OUTSTANDING:

NOMINAL - taken from BGN OF MONTH AMT OUTSTANDING column in monthly amortization table below; uses first month of each year (#1, #13, #25)/1000.

REAL - (This Year's LOAN OUTSTANDING NOMINAL)/(Previous Year's PRICE INDEX/100)

RATE OF RET:

NMINL -  $((1 + @IRR(\text{est, range of MTHLY PAYMENT MADE}))^{12}) - 1$   
from amortization table

REAL -  $((1 + @IRR(\text{est, range of DEFLATED MTHLY PAYMENTS}))^{12}) - 1$   
from amortization table

LOAN REPAYMENT PERIOD - @MAX(value in MONTH column) since month values are only displayed up to point where loan is paid off.

PEAK LOAN AMOUNT - @MAX(value in END OF MONTH AMOUNT OUTSTDG)/1000

MONTH WITH PEAK LOAN AMT - @VLOOKUP ((PEAK LOAN AMOUNT x 1000), Range, 16)  
finds peak loan amount and reads 16 columns over to unlabeled month column

TOTAL AMOUNT RECOVERED:

IN CURRENT TERMS - @SUM(MTHLY PAYMENTS MADE)/1000  
Month #1 to end of column

IN REAL TERMS - @SUM(DEFLATED MONTHLY PAYMENTS)/1000  
Month #1 to end of column

REAL AMT RCVRD AS % OF LOAN - (TOTAL AMOUNT RECOVERED)/(BGN OF MONTH AMOUNT  
IN REAL TERMS OUTSTDG Month #0

MONTH - for the first year, 1+ Previous Year; thereafter,  
if END OF MONTH OUTSTANDING = 0 then 0, else Previous Year + 1

MTHLY MIN WAGE - takes MIN WAGE for Yr. #0 above/12 x 1000; thereafter,  
if MONTH # = 0, then 0, else MIN WAGE from appropriate Yr. column;  
i.e. in the second year of repayment (Month #13) takes yearly MIN WAGE  
from Yr. # 1.

NTR RATE CHGD MTHLY - takes MHF'S LENDING RATE: NOMINAL from above for year  
corresponding to MIN WAGE (i.e. lagged); converted to monthly rate:  
 $((1 + \text{rate})^{1/12}) - 1$ ; after first year, checks to see if MONTH = 0;  
otherwise continues;

BGN OF MONTH AMOUNT OUTSTDG - in Month #0 can be separate input or can be taken from ~~beginning~~ of construction loan; thereafter, takes END OF MONTH AMOUNT OUTSTDG of previous month; after first year, checks to see if the end of month amount is 0; if not, uses it;

MONTHLY INTER PAYMENT DUE -- if previous END OF MONTH AMOUNT OUTSTDG is 0, then 0; else, previous month's BGN OF MONTH AMOUNT OUTSTDG) x (INTR RATE CHGD MTHLY)

MONTHLY PAYMENT DUE -  
Mo. ~~is~~ ~~the~~ ~~sum~~ of "BGN OF MONTH AMOUNT OUTSTDG"  
Mo. ~~is~~ ~~the~~ ~~sum~~ of ("REF RATE") x (Yr. 1 "BENEF INCOME") x 1000/12  
Mo. ~~is~~ ~~the~~ ~~sum~~ of previous month's MONTHLY PAYMENT AMOUNT  
Mo. ~~is~~ ~~the~~ ~~sum~~ of if (BGN OF MONTH AMOUNT OUTSTDG for this month) + (MTHLY INTER PYMNT DUE for current month)  
is ~~the~~ ~~sum~~ of

MONTHLY PAYMENT DUE x (1+ MIN WAGE % INCR) x (1- DECREASE IN REF RATE)  
previous month's in previous yr

then, ~~is~~ ~~the~~ (BGN OF MONTH AMOUNT + (MONTHLY INTER PYMNT DUE  
OUTSTDG for this mo) for this month)

else, ~~is~~ ~~the~~ (MONTHLY PYMNT MADE x (1+ MIN WAGE % INCR x (1- DECREASE IN  
for previous yr) for previous yr) REFERENCE RATE)

UNPD AMNT TO BE CPTLZED - This Month's (MTHLY INTER) - (MTHLY PYMNT MADE)  
PYMNT DUE

END OF MONTH AMOUNT OUTSTDG - This Month's (BGN OF MONTH AMOUNT OUTSTDG)  
+ (UNPD AMNT TO BE CPTLZED)

PYMNT AS A PROP OF MW - This Month's (MTHLY PYMNT MADE)/(MTHLY MIN WAGE)  
after first year, checks if 0, then continues

PYMNT AS A PROP OF FMLY INCOME - (MTHLY PYMNT MADE)/((BENEF INCOME x 1000)/12)  
uses Yr #1 income for Months #1-12, Yr #2 income for Months #13-24, etc...

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## Appendix VIII

### MOBILIZING SAVINGS FOR CONSTANT VALUE MORTGAGE

Considered strictly as a financial institution, the MHF is an unbalanced entity. Although it creates financial assets, it fails to deploy these assets in ways that could contribute to the financial mobilization of Turkish savings. The MHF is in this sense no more than a "half-bank." It makes mortgage loans, but fails to establish a sustainable circular flow of resources by financing its mortgage holdings in financial markets. It does not dedicate any of the cash flows of interest and loan repayments that its asset portfolio generates to supporting liabilities designed to be attractive to savers. The absence of a parallel flow of voluntary financing submerges what would be a natural link between the riskiness of the institution's leveraged investment in housing-related assets and the interest rate it would have to pay to fund its debt. Being able to support mortgage loans by projected flows of future tax revenues spares MHF managers from the market discipline of having to persuade its borrowers to promise the MHF a series of contractual cash flows large and reliable enough to convince savers that the fund's future operations are viable. Because its projected cash flows cannot meet this implicit self-sustainment test of market discipline, the MHF is not an institution that could remain viable for long without the government's tax powers.

The institution's financial problems are twofold. The MHF finds itself squeezed between a rising demand for the combination of subsidies and credit it dispenses and the ability to provide such large government transfers to such a large component of fixed capital formation. This

dual pressure on MHF resources is crushing its finances under the weight of unrealizable client expectations and the diversion of 30 percent of its 1987 revenues back into the government's general budget.

Resolving the MHF's Funding Crisis

The MHF finds itself sitting uncomfortably on the cusp of the honeymoon and renewal phases of the sectoral-development-bank life cycle. Rapid expansion of its applicant pool has conflicted with reductions in its access to tax revenues to force a suspension of its new lending activity.

To restore new lending, the MHF must develop new funding sources. For this funding to proceed on a self-sustaining basis, the subsidy element in MHF loans must be separated from the mortgage-credit element and reduced to a manageable size. This must be done so that the cash flows from MHF mortgage holdings can be transformed into backing for specific forms of MHF debt (securities or deposits) that banks, pension funds, and household savers would voluntarily choose to hold.

Two principal domestic markets for mortgage-backed MHF debt can be discerned: banks and household savers. A potential third and extranational source consists of foreign financial institutions. To tap any of these financial pools requires using instruments that can credibly promise interest rates in excess of either anticipated or actual rates of inflation.

That Turkish households will voluntarily engage in well-compensated mortgage lending is shown by the quick recovery of the country's so-called "interperson" mortgage market from the defaults and scandals of 1983. Despite unpleasant memories of the spectacular default of Banker

Kastelli and the failures of Hisarbank and Istanbul Bank experienced in 1983, households remain willing to have their savings brokered by "money trading houses." Turkish households are currently estimated to give brokers roughly 10 billion Turkish lira per year to be funneled into high-quality mortgage loans. Directed to industrialists, traders, and contractors, these loans offer three to four times the deposit interest rates currently paid by commercial banks. Further evidence of the responsiveness of household saving to inflation-adjusted interest rates is provided by the success of the foreign-denominated deposit account at Turkish banks.

Among Turkish households, the most easily tapped savings pool promises to be the savings of households that are in the process of accumulating funds to become first-time homeowners. In fact, one ultimately ineffective means of mobilizing resources for the MHF would be to extend the length of the MHF's preloan qualifying period and raise the size of applicants' qualifying deposits as a time-buying way to prolong the existing pattern of subsidization. If such deposits were mobilized at less than market interest rates, it would amount to a Ponzi or pyramid scheme. This is so because it would use funds put up by new applicants rather than MHF earnings and repayments to finance loans to entities that stand ahead of these applicants in the loan-processing queue. The dangers of this strategy are twofold. It would delay the MHF's transition to a self-sustaining basis and permit potentially enormous hidden losses to develop in the Fund. The inevitable breakdown in funding, when it occurred, would undermine public confidence, not only

in the MHF, but in the policy makers that acquiesced in such a pyramid scheme.

The desirability of minimizing such temptations suggests the value of permitting households the option of holding qualifying deposits for MHF loans in competitive forms of real-estate or home-purchase savings accounts at banks and other financial institutions. At the same time, to link these accounts to MHF debt, Turkish financial authorities should allow institutions that hold a portfolio of MHF debt securities to issue direct or indirect low-denomination participations in this portfolio to household and business customers. In this way, the maximum amount of such instruments that any individual bank could issue would be limited to its total holdings of MHF debt and the returns offered on these accounts could be insulated to a large extent from the other operations of the bank.

Clearly, before these accounts can promise a decent after-tax inflation-adjusted return, the new MHF loans which MHF securities are intended to finance must be converted into inflation-adjusted mortgage contracts as well. To succeed, an inflation-adjusted mortgage contract must be fair to borrowers and lenders alike. The adjustment mechanism must be easily understood and the adjustment trigger easily observed and not subject to prolonged direct manipulation by either of the contracting parties. Finally, the risks and burdens of the contract must be shared equitably, realistically, and as efficiently as possible. The policy constraints on the design of such a contract are discussed in the next section.

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A plan to mobilize financial resources for MHF loans amounts to converting the MHF into the equivalent of an inflation-adjusted mutual fund to be sold directly to financial institutions and indirectly to households. The fund would interpose a guarantee between its particular cooperative and household mortgage borrowers and institutional investors in MHF debt: the MHF's own guarantees of full and timely payment to holders of its debt would protect investors from concerns about household willingness and ability to repay should a measure of aggregate real wages fall. By adding a third guarantee that would establish a minimum foreign-exchange value for the foreign-financed portion of the MHF cash flows that accrue nominally in Turkish lira, the Treasury could make MHF securities attractive to foreign financial institutions as well.

Overcoming Politician Problems of Authorizing An Inflation-Adjusted Contract

In governmental circles the world around, Latin American countries' experience with adjusting wage rates and financial obligations for inflation has tended to give the term inflation indexation a bad name. Although indexation is clearly associated with hyperinflation in Latin countries, indexation should by no means be labelled the cause of these hyperinflations. Hyperinflation is best understood as a tax policy that governments in inflating countries judge to be administratively and politically more efficient at the margin than increases in income, sales, or wealth taxes. Whenever inflation is high or variable, indexation can be used to prevent the inflation tax from imposing costly and unpredictable burdens on parties to long-term contracts.

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In Turkey, some apparently fear that openly permitting a governmental institution to index its financial assets and liabilities would be interpreted popularly as an official surrender to the forces of hyperinflation. According to this view indexing MHF contracts would feed a demand for the indexation of other contracts and by making inflation easier to live with, widespread indexation would weaken the nation's future anti-inflation effort politically. This argument suggests that any move to index MHF contracts should be accompanied by dramatic action to impose binding limits on the future expansion of the money base and/or should be called by another and less colorful name that would associate it with a trigger index other than wages or prices. It is of course true that complete indexation of financial contracts in an economy could create a very difficult policy environment for monetary officials in an economy with growing government command over total resources in the economy. However, the argument for the indexation of mortgage contracts in the Turkish environment is more narrow than the macroeconomic argument as to whether indexation is desirable. In Turkey, the housing sector has shown that it is able to elicit large transfers from the government to substitute for indexed instruments. The introduction of indexation in such a sector would be an attempt to replace the existing system for transfers with one that provided finance.

In mortgage lending, an effective inflation-adjustment mechanism can take many forms. Alternative adjustment mechanisms differ in the complexity and abruptness of contract adjustments, in their susceptibility to manipulation, and in the liquidity burdens they impose

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on borrowers and lenders. Adjustment can be defined in terms of greater or less frequency, averaged over periods of different length, and be distributed flexibly between adjustments in the mortgage's periodic payment level and changes in the size and maturity of the mortgagor's remaining loan balance. They can also include the government's explicit sharing of part of the macroeconomic risks that the loan will be repaid.

Although governmental officials have until very recently rejected efforts to index returns on financial instruments (such as bank deposits) formally to measures of the rate of inflation, the market has developed a series of workable substitutes for formal indexation. Informal devices for effectively adjusting the obligations of long-term contracts for expected or actual inflation have been deployed in Turkey for years. The wealth of an economic decisionmaker who did not construct and use subjective indexes of inflation, inflation volatility, and foreign-exchange rates would not long survive in modern Turkey. No private bank, household, or nonfinancial corporation is knowingly and voluntarily going to commit funds to projects or instruments that promise them negative real after-tax returns.

Perhaps the clearest example of de facto adjustable-rate lending occurs when what is in fact a long-term financing agreement is written as a series of renewable short-term loans. At most interim maturity dates, neither the lender nor the borrower expects the borrower to have the resources in hand to repay the loan in full. What both parties expect and the contract enforces is an option to adjust the interest rate on the next period's segment of the loan for interim movements in the value and opportunity cost of money.

Another class of inflation-adjusted contract is embodied in "participation certificates" of various kinds. Transferable shares in the resources owned by a cooperative constitute an important example of such instruments. These shares function de facto as an inflation-adjusted savings account, albeit one that lacks government insurance.

A third example of de facto indexing occurs in bank loans to private construction companies that are engaged in building high-income housing. Private contracts whose payments are indexed to interest rates or foreign exchange. By tying the terms of construction loans to the receipts a borrower receives from these contracts, banks effectively index their loans.

By following the market's lead, MHF officials can develop workable substitutes for straightforward inflation indexing without violating the specific political constraints that they believe need to be respected. In this way, Turkish authorities can if they wish simultaneously reject inflation indexation de jure and enjoy its benefits de facto.

#### Expanding the MHF's Lending Agents

Currently, the Emlak and the Pamuk banks are the exclusive agents for placing and servicing MHF loans. As compensation for their efforts, they receive a mix of explicit commission payments and a series of implicit receipts from the interest-free use of program-related funds. Agent banks' commissions consist of 1.5 percent of MHF loan funds as they advance them and 2.0 percent of all repayments as they are received. Agent banks' major sources of implicit receipts are zero-interest accounts that must be maintained by cooperatives and individuals that seek MHF loans. At the end of 1987, about 65 billion

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Turkish lira stood on deposit in such accounts. A secondary source of implicit receipts is the float on funds being transferred to and from the MHF's account at the central bank.

For years, Turkey assigned the task of housing finance to the Emlak Bank, legally excluding other banks from making housing loans. As regulation of the Turkish financial sector has been liberalized, possibilities developed for private banks (such as the Pamuk bank) to make mortgage loans.

Current Turkish law permits banks to apply for the authority to make real-estate loans, Public banks can (on the basis of their financial condition and evidence establishing their planned future commitment to real-estate finance) receive this authority directly from the Treasury, while private and foreign banks need to clear their applications also through the Council of Ministers.

For MHF securities to reach the broadest possible market, it is necessary that all banks be permitted and even encouraged to act as agents for future MHF loans.

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