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Analyses of Alternative Mortgage Instruments for Bulgaria

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Analyses of Alternative Mortgage Instruments for Bulgaria

January, 1992

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ABSTRACT

In the fall of 1991, an Urban Institute team funded by USAID reviewed Bulgaria's banking system and housing finance industry. This examination indicated that the introduction of alternative mortgage instruments (AMIs) might significantly improve borrower affordability and lender protection in the industry. This report explores the effects on Bulgarian borrowers and lenders of introducing AMIs, and addresses specific concerns raised about the products by management at the Bulgarian National Bank, State Savings Bank and Bulgarian Post Bank.

EXCHANGE RATES

In December 1991 the exchange rate was approximately 21 leva per U.S. dollar.

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Overview

Introduction

In the Spring of 1991, the United States Agency for International Development's Office of Housing and The Urban Institute began to undertake shelter-related work in Bulgaria. Housing finance was identified as one area in which the Bulgarian's might benefit from technical assistance. In the fall of 1991, an Urban Institute team funded by USAID reviewed Bulgaria's banking system and housing finance industry.[1] This examination indicated that the introduction of alternative mortgage instruments (AMIs) might significantly improve borrower affordability and lender protection in the industry.

The following documents were prepared by the Urban Institute during the winter of 1991-1992. The purpose of these reports was to explore the effects on Bulgarian borrowers and lenders of introducing AMIs, and to address specific concerns raised about the products by management at the Bulgarian National Bank (BNB), State Savings Bank (SSB) and Bulgarian Post Bank (BPB). The following are very brief summaries of each of the attached documents:

Presentation and accompanying text summary entitled "Performance of Mortgage Instruments Under Alternative Bulgarian Macroeconomic Scenarios"

These documents explore how fixed rate mortgages (FRMs) Price Level Adjusted Mortgages (PLAMs) and Duel Index Mortgages (DIMs) perform under alternative assumptions about future wage and price movements in Bulgaria. The presentation demonstrates that PLAMs and DIMs increase mortgage affordability by a factor of five versus the FRM under Bulgaria's current interest rate regime. Furthermore, real internal rate of return is constant under the DIM and PLAM while it fluctuates with inflation for the FRM.

The DIM's loan term increases and the PLAM's payment to income ratio rises under

[1] These findings are detailed in the Urban Institute report entitled "The Bulgarian Banking System and the Housing Finance Market" and are summarized in the Institute's "Bulgarian Shelter Sector Assessment."

negative assumptions about future real wages. When real wages fall rapidly to 80 percent of their initial level and remain depressed over the life of the loan, loan term increases from 15 to 20 years for the DIM. When wages decline to 30 percent of their initial level, the payment to income ratio rises from 25 to 34 percent. Thus, even under quite negative macroeconomic assumptions, the risk engendered by these instruments should be manageable.

Presentation and accompanying text summary entitled "Options for Establishing State Savings Bank Profitability Under a Positive Real Interest Rate Regime"

These documents analyze the impact on Savings Bank profitability of the SSB moving to a positive real interest rate regime. As competition for household savings increases in Bulgaria, the SSB will be forced to raise the interest rate it pays on deposits. This will result in significant losses for the firm unless it takes decisive steps to modify its asset portfolio.

There are four basic strategies the firm could employ to restore profitability. The SSB could increase the real interest rate it charges on PLAM loans issued after 1990. Yet this would require a very significant increase in loan rates that would reduce mortgage affordability and stymie commercial investment. In effect, industry and new borrowers would be providing an enormous subsidy to households with loans issued before 1991. The bank could charge a very high nominal rate on the fixed rate mortgages it issued before 1991. Yet, with inflation of 138 percent in August 1991, the firm would have to increase the nominal rate on mortgage loans from 10 to 123 percent. Alternatively, the SSB could reduce the ratio of loans issued before 1991 to total loans. However, this would take time and would probably require expensive prepayment incentives. Finally, the firm could convert loans issued before 1991 to PLAMs. Even under very negative assumptions about future macroeconomic conditions these loans would be very affordable to mortgage holders and would easily restore SSB profitability. This last strategy is strongly recommended by the Urban Institute team.

Memo entitled "Impact of Subsidized Government and Inter-Bank Lending on State Savings Bank Profitability"

This memo follows on the presentation of State Savings Bank profitability discussed above. The above presentation assumes that the SSB charges a real interest rate of 4.5 percent on inter-bank and government loans. Management at the SSB and the BNB felt that for political reasons it might be necessary to charge significantly lower rates. This memo considers the impact on SSB profitability of subsidizing these loans and explores means of exploring the profitability erosion that would result.

Given the SSB's current asset portfolio and assuming all mortgage loans are converted to PLAMs with interest rates of 4 to 6 percent, lending to the government at a real interest rate of -1 percent and to banks at 2 percent reduces profitability from an estimated 23 percent to -22 percent.

To restore profitability, the SSB could increase the proposed real interest rate charged on household loans from the base case rate of from 4 to 6 percent to from 10 to 15 percent. These rates would dampen loan affordability and reduce economic growth. Furthermore, they are unlikely to be sustainable over the medium term. Another option for achieving acceptable profitability is to radically reduce the subsidized loans' share of total assets. Nevertheless, this would take time and is unlikely to be acceptable to the government. Finally, the SSB could achieve acceptable profitability by increasing slightly the rates it charged to banks and the state. If the SSB charged the state a 2 percent real rate and other banks a 3.7 percent rate the SSB could restore profitability. The government could finance the resulting deficit on budget. This is the solution recommended by the Urban Institute and the one we feel the World Bank and the IMF would support.

Memo entitled "Comparison of Mortgage Instrument Performance for Actual SSB Loan Cases Under Alternative Macroeconomic Scenarios"

State Savings Bank management requested a comparison of how PLAMs, DIMs and FRMs would perform for an actual loan issued before 1991, an actual loan issued in 1991 and a hypothetical loan issued in 1992. All three loan cases were selected by SSB management. Loan performance was reviewed under one hypothetical macroeconomic scenario of constant real wages and one of declining real wages.

For most loans, PLAMs yield maximum payment to income ratios of one-half or less of those for FRMs, and DIM ratios are below PLAMs' under the pessimistic wage case. PLAMs and FRMs always have the same loan term. The term is one-third to hone-half longer for DIMs under the pessimistic wage case.

Memo entitled "Credit Risk for the PLAM and DIM in Bulgaria During Periods of Decline in Real Property Values"

SSB and BNB management requested a review of the credit risk lenders face when they underwrite PLAMs and DIMs during periods of decline in real property values.

Under the PLAM, banks' potential loss from borrower default is affected only by real property prices. As long as the relationship between general inflation and property values is maintained, credit risk does not vary with inflation. Credit risk for the PLAM is relatively low. Even assuming a relatively high loan-to-value ratio and a decline in the real value of property to 55 percent of its initial level the bank never stands to lose more than 9 percent of the loan balance outstanding if the borrower defaults and the bank is forced to resell the home.[2]

Under the DIM, banks' credit risk is influenced by both real property values and real wages. Nevertheless, even assuming real wages fall to 75 percent of their initial level over five years and property values fall to 55 percent of their initial level over the same period, real bank losses from the sale of repossessed units never exceeds 22 percent of the loan balance outstanding.

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[2] This analysis does not take into account the bank's transaction costs of repossessing the unit and selling it.

I. Summary Report of Presentation on Alternative Mortgage Instrument Performance in Bulgaria

1. Introduction

In 1991, inflation in Bulgaria became extremely erratic varying in the first eight months of the year from a high of 123 percent for a single month to a low of 0.8 percent. The State Savings Bank (SSB) charged in October 1991, approximately 49 percent interest on new mortgage loans. The bank offers only one mortgage product--a fixed rate, equal monthly installment instrument. Inflation from January through August 1991 was approximately 385 percent. Thus, the SSB's 49 percent is highly negative in real terms. The bank is not losing money on these loans because deposit rates are lower still.

Under a fixed rate scheme with a 49 percent interest rate, borrowers are required to repay almost half of the loan amount in interest alone in the first year of the mortgage. This requirement decimates mortgage affordability. From 1987 to 1991, the real value of the SSB's average mortgage loan declined by 78 percent. This decrease in loan size was largely due to reduced affordability engendered by steep interest rates.

In principle the SSB has the right to raise rates on mortgages underwritten after January 1991 whenever it chooses. In practice however, if the SSB is forced at a later date to pay a significantly higher rate to attract liabilities, it may face serious political pressure to refrain from raising interest rates on outstanding loans and also risk provoking widespread defaults if it does so.

In an environment of high and erratic inflation, alternative mortgage products (AMIs) such as the Price Level Adjusted Mortgage (PLAM) and the Dual-Index Mortgage (DIM) can restore loan affordability while still permitting lenders to charge a consistent, positive real interest rates. Boosting loan affordability reduces pressure for government housing subsidies and contributes to economic growth by increasing construction activity. Charging a positive real interest rate allows lenders to offer a liability with a similar constant real return (which is highly desirable to depositors) thereby substantially reducing the bank's interest rate risk.

The presentation outlined below will demonstrate how DIMs and PLAMs outperform fixed rate, equal monthly installment mortgages (FRMs) in terms of loan affordability for

borrowers and interest rate risk reduction for lenders.[3] It will also explore the default and term risk these instruments incur under three scenarios for future macroeconomic conditions in Bulgaria.

2. Macroeconomic Scenarios

This presentation examines how FRMs, PLAMs and DIMs perform under three alternative macroeconomic scenarios. In the "Constant Wage Case" we assume that inflation has reached its peak at the start of the loan and that it gradually declines over time and that wage growth always equals inflation. Thus, real wages are constant at their initial level over the life of the loan. In the "Pessimistic Real Wage Case" we again assume that inflation declines gradually over the period. However, in this case, we further assume that wage growth fluctuates around inflation and that real wages decline to about 80 percent of their current level and then fluctuate from 80 to 85 percent of their current level. In the "Real Wage Spike" scenario we assume that inflation increases rapidly over the early years of the loan and then declines gradually over time. Wages fluctuate around inflation and real wages decline precipitously to about 70 percent of their current level before increasing gradually to about 90 percent of their current level.

3. Fixed Rate Mortgages

For the purposes of this exercise, we assume an average Bulgarian family with two children under the age of 18 earns 32,472 LV per year. If this family devotes 25 percent of their income to mortgage payments and faces a 49 percent interest rate and a 15 year loan term, they will be able to afford a loan of approximately 16,526 LV. This is equivalent to only 13 percent of the cost of a 50 square meter unit selling for 2,500 LV per square meter. The reason for this low affordability is that payments are fixed in nominal terms and therefore decline rapidly in real terms. Thus, the overwhelming portion of the loan must be repaid in the first few years of the mortgage term.

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[3] See Telgarsky and Mark "Alternative Mortgage Instruments In High Inflation Economies" for a more complete exposition of DIMs and PLAMs.

4. Price Level Adjusted Mortgages (PLAMs)

PLAMs adjust for the payment tilt problem described above by allowing nominal payments to increase over time as households' incomes rise. The interest rate the borrower faces is the real interest rate. Inflation is accounted for via yearly adjustments in the outstanding loan principle and payments are recalculated based on the new principle and the remaining term of the loan. Assuming the same household and housing characteristics described above and a 6 percent real interest rate, the affordable loan size under a PLAM is 78,844 LV--a figure almost five times as high as that of the FRM and equal to approximately 63 percent of the cost of a unit. The salient feature of the PLAM which varies under the macroeconomic scenarios described above is the payment to income ratio. In the constant real wage case, this ratio is 25 percent over the life of the loan. Under the pessimistic wage case it fluctuates but never rises above 31 percent. Under the real wage spike case it also fluctuates but never exceeds 34 percent. While a ten percentage point increase in this ratio is large, the highest absolute value of the ratio--34 percent remains affordable for most families. Furthermore, this high figure results from a large -30 percent--decline in real wages.

5. Dual-Index Mortgages (DIMs)

Under the DIM, like under the PLAM, banks make an annual adjustment to the loan's outstanding principle based on inflation, thereby obviating the need to include inflation in the loan's interest rate. Thus, the affordable loan size under the DIM and the PLAM are identical. But under the PLAM, payments are adjusted based on increases in the outstanding principle whereas under the DIM payment increases are tied to wage increases. Thus, while the loan's payment to income ratio varies under the PLAM it is constant under the DIM. But, under the DIM, if wage growth and inflation do not move together, real loan payments will fluctuate and the DIM will not close on time. Under the constant real wage scenario, the DIM closes in 15 years as was intended when the loan was issued. Under the pessimistic real wage scenario, real payments fluctuate but are roughly 1,000 LV less per year than was anticipated when the loan was issued. For this reason the loan takes 20 years to close. Under the Real Wage Spike scenario, payments drop to a low of about 2,000 LV below their anticipated level but then rally and almost regain their anticipated level. Under this scenario,

the DIM takes 19 years to close. Thus, this form of mortgage ensures that borrowers are never required to pay more than a pre-determined payment to income ratio but their loan term can vary considerably. In this exposition, when real wages fell to about 80 percent of their initial level and remain depressed, the loan term increased by about one-third.

6. Conclusion

Under the conditions described above, PLAMs and DIMs allow an average Bulgarian family to take out a loan almost 500 percent larger than the loan they could afford under a FRM. Furthermore, PLAMs and DIMs shield lenders from much of the interest rate risk they incur with FRMs. Under the loan terms described above, the FRM has a -11 percent internal rate of return (IRR) for the constant wage and pessimistic wage scenarios and a -43 percent IRR for the wage spike scenario. The DIM and PLAM retain their 6 percent IRR regardless of the macroeconomic conditions encountered since in both cases the real value of loan repayments is preserved.

Thus, the DIM and the PLAM eliminate the principle problems the FRM encounters in high and/or volatile inflation but they do engender additional risks to the borrower in the form of a floating payment to income ratio or varying term and this in turn can contribute to higher default risk for the lender. Nevertheless, this exercise has demonstrated that even under quite stressful macroeconomic conditions, both payment to income ratios and loan terms remain acceptable.

A later presentation will examine what impact adoption of these instruments and return-matched liabilities would have on the SSB's profitability under alternative assumptions regarding the interest rates charged on the SSB's assets.

II. Presentation on Performance of Mortgage Instruments Under Alternative Bulgarian Macroeconomic Scenarios

1. PRESENTATION OVERVIEW

1) MACROECONOMIC SCENARIOS

2) FIXED RATE MORTGAGE (FRM) PERFORMANCE

3) PRICE LEVEL ADJUSTED MORTGAGE (PLAM) PERFORMANCE

4) DUAL-INDEX MORTGAGE (DIM) PERFORMANCE

5) COMPARISON OF MORTGAGE INSTRUMENTS

6) CONCLUSION

2. MACROECONOMIC SCENARIOS

1: Constant Real Wage Case

Declining inflation

Nominal wage growth always equals inflation

2: Pessimistic Real Wage Case

Declining inflation

Wage growth fluctuates around inflation but real wages fall

3: Real Wage Spike Case

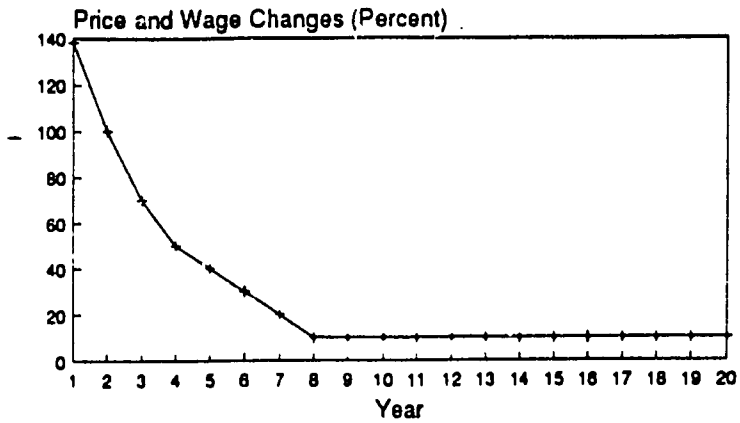
Increasing inflation

Wage growth fluctuates around inflation

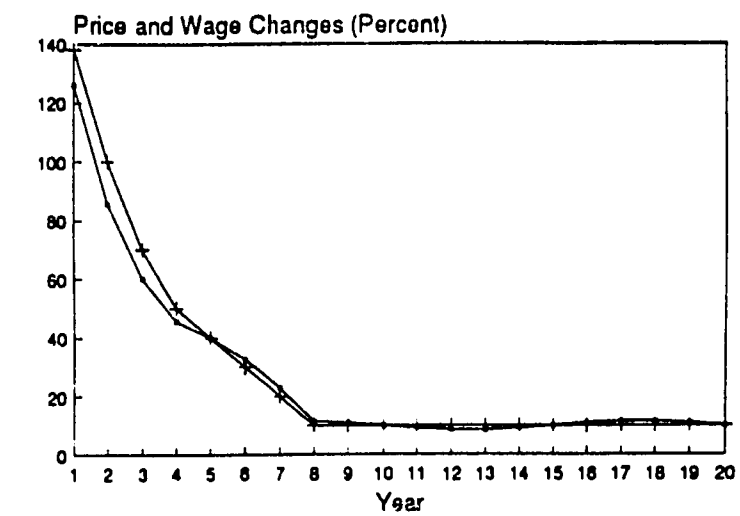
Real wages plummet but then largely recover

3. MACROECONOMIC SCENARIOS

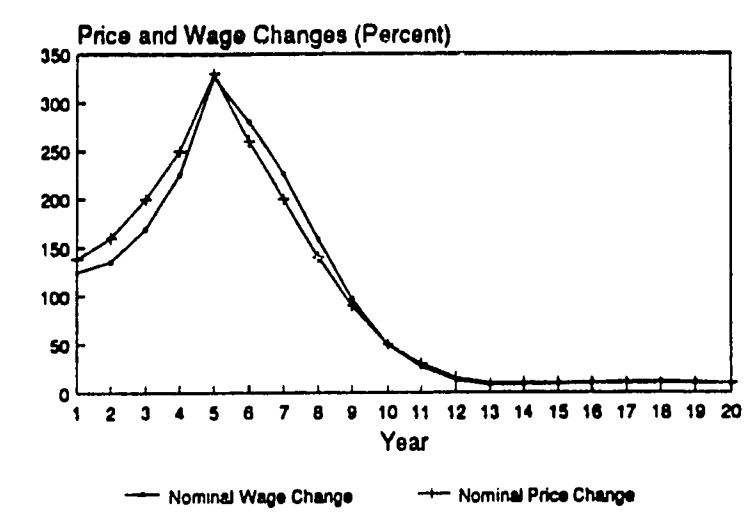
Constant Real Wage Case



Pessimistic Real Wage Case

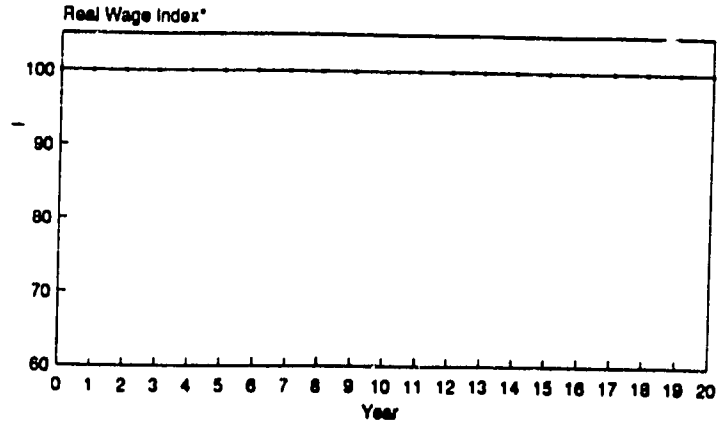


Real Wage Spike Case

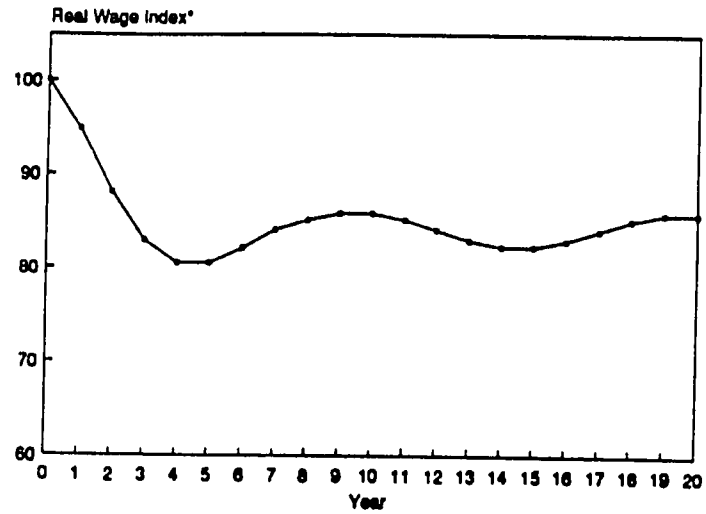


4. MACROECONOMIC SCENARIOS

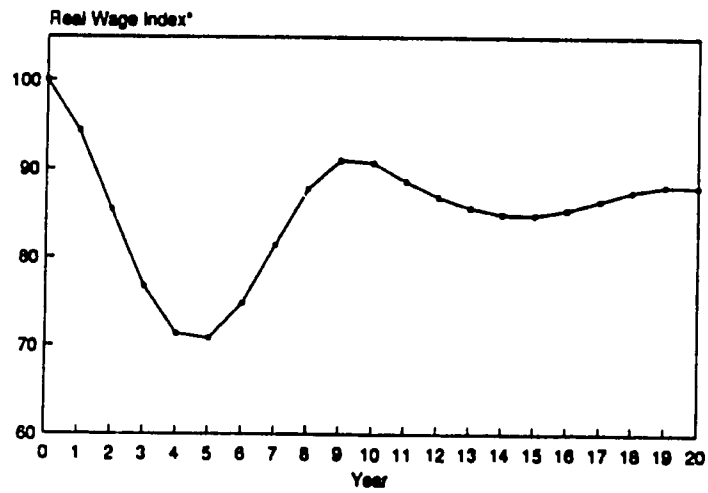
Constant Real Wage Case



Pessimistic Real Wage Case



Real Wage Spike Case



*nominal wage index/nominal price index

5. Fixed-Rate Mortgage: Constant Real Wage Case
Declining Inflation; Wage Growth Always Equals Inflation

LOAN TERMS

Annual household income (LV)	32,472
Share of income to housing (percent)	25.0
Interest rate (percent)	49.00
Loan term (years)	15
Loan amount (LV)	16,526
Loan-to-value ratio; 50 sq. meter apt (percent)	13.2

	Nominal					Real		Payment/
Year (1)	Payment (2)	Interest (3)	Principal (4)	Inflation Adjustment (5)	Loan Balance (6)	Payment (7)	Loan Balance (8)	Income (percent) (9)
1	8,118	8,098	20	NA	16,505	3,408	6,930	10.5
2	8,118	8,087	31	NA	16,474	1,704	3,458	5.2
3	8,118	8,072	46	NA	16,429	1,002	2,029	3.1
4	8,118	8,050	68	NA	16,361	668	1,347	2.1
5	8,118	8,017	101	NA	16,260	477	956	1.5
6	8,118	7,967	151	NA	16,110	367	729	1.1
7	8,118	7,894	224	NA	15,885	306	599	0.9
8	8,118	7,784	334	NA	15,551	278	533	0.9
9	8,118	7,620	498	NA	15,053	253	469	0.8
10	8,118	7,376	742	NA	14,311	230	405	0.7
11	8,118	7,013	1,105	NA	13,206	209	340	0.6
12	8,118	6,471	1,647	NA	11,559	190	271	0.6
13	8,118	5,664	2,454	NA	9,105	173	194	0.5
14	8,118	4,461	3,657	NA	5,448	157	105	0.5
15	8,118	2,670	5,448	NA	0	143	0	0.4

Total real repayments (constant Year 0 LV)	9,566
Lender's real IRR (percent)	-10.71

6. INTRODUCTION TO PLAMS AND DIMS

- Increase mortgage affordability in high and/or volatile inflation environments by rearranging in time when payments are made
  - Higher nominal payments are made later when households can afford them

- PLAM
  - Nominal payments increase over time with inflation

- DIM
  - Nominal payments increase over time with wage growth

7. Price Level Adjusted Mortgage: Pessimistic Real Wage Case Declining Inflation; Wage Growth Significantly Lags Price Growth

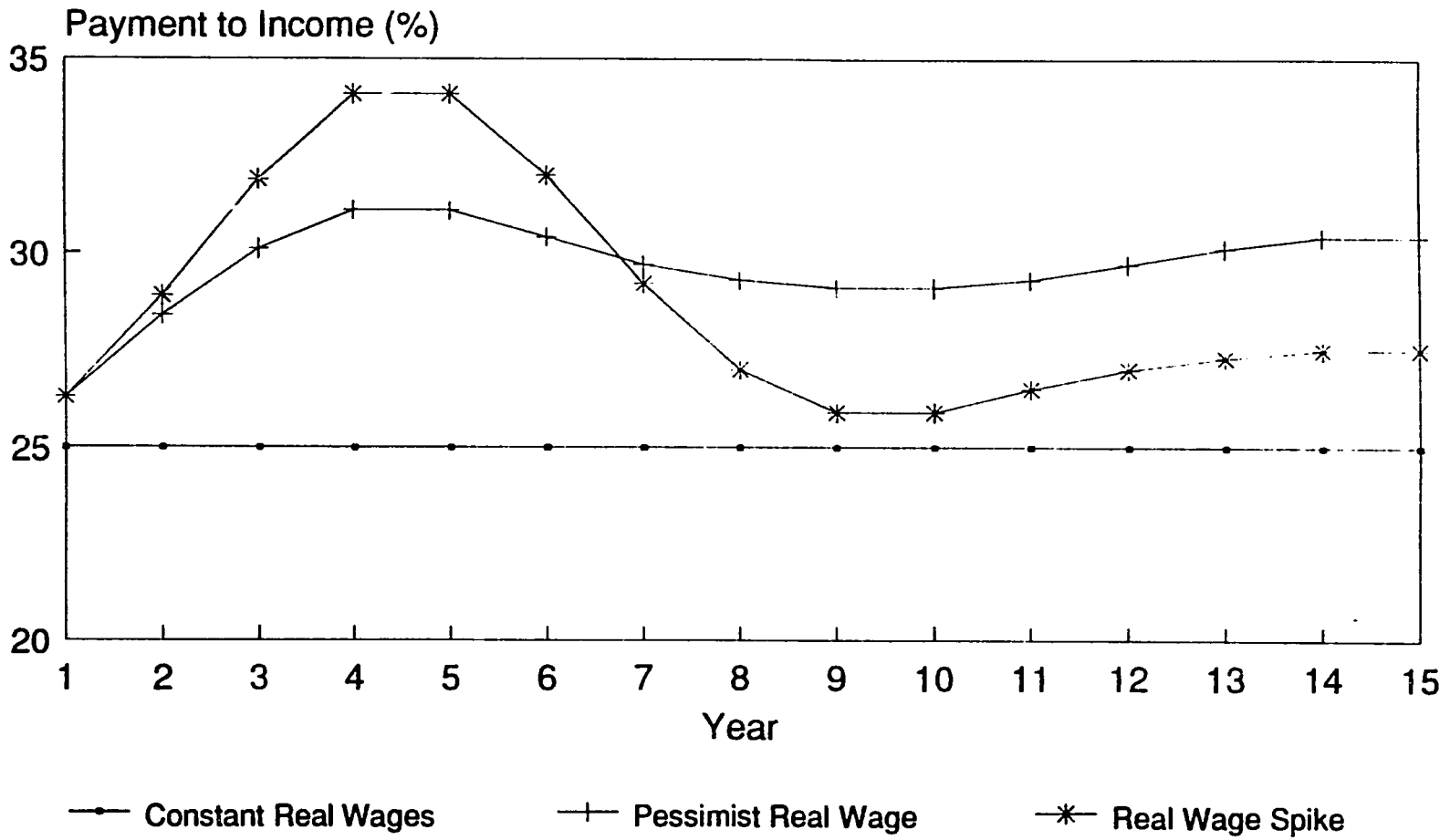
LOAN TERMS

Annual household income (LV)	32,472
Share of income to housing (percent)	25.0
Interest rate (percent)	6.00
Loan term (years)	15
Loan amount (LV)	78,844
Loan-to-value ratio; 50 sq. meter apt (percent)	63.1

	Nominal					Real		Payment/
Year	Payment	Interest	Principal	Inflation Adjustment	Loan Balance	Payment	Loan Balance	Income (percent)
0								
1	19,335	11,267	8,068	(108,945)	179,721	8,118	75,457	26.3
2	38,671	21,567	17,104	(179,721)	342,338	8,118	71,866	28.4
3	65,740	34,919	30,821	(239,637)	551,154	8,118	68,060	30.1
4	98,610	49,604	49,006	(275,577)	777,724	8,118	64,026	31.1
5	138,054	65,329	72,725	(311,090)	1,016,089	8,118	59,749	31.1
6	179,470	79,255	100,215	(304,827)	1,220,701	8,118	55,216	30.4
7	215,364	87,890	127,474	(244,140)	1,337,367	8,118	50,411	29.7
8	236,901	88,266	148,634	(133,737)	1,322,469	8,118	45,318	29.3
9	260,591	87,283	173,308	(132,247)	1,281,409	8,118	39,919	29.1
10	286,650	84,573	202,077	(128,141)	1,207,473	8,118	34,196	29.1
11	315,315	79,693	235,621	(120,747)	1,092,599	8,118	28,130	29.3
12	346,846	72,112	274,735	(109,260)	927,124	8,118	21,700	29.7
13	381,531	61,190	320,341	(92,712)	699,496	8,118	14,883	30.1
14	419,684	46,167	373,517	(69,950)	395,928	8,118	7,658	30.4
15	461,652	26,131	435,521	(39,593)	0	8,118	0	30.4

Total real repayments (constant Year 0 LV)	121,770
Lender's real IRR (percent)	6.00

PLAM Performance
Under Three Macroeconomic Scenarios



9. Dual-Index Mortgage: Pessimistic Real Wage Case
Declining Inflation; Wage Growth Significantly Lags Price Growth

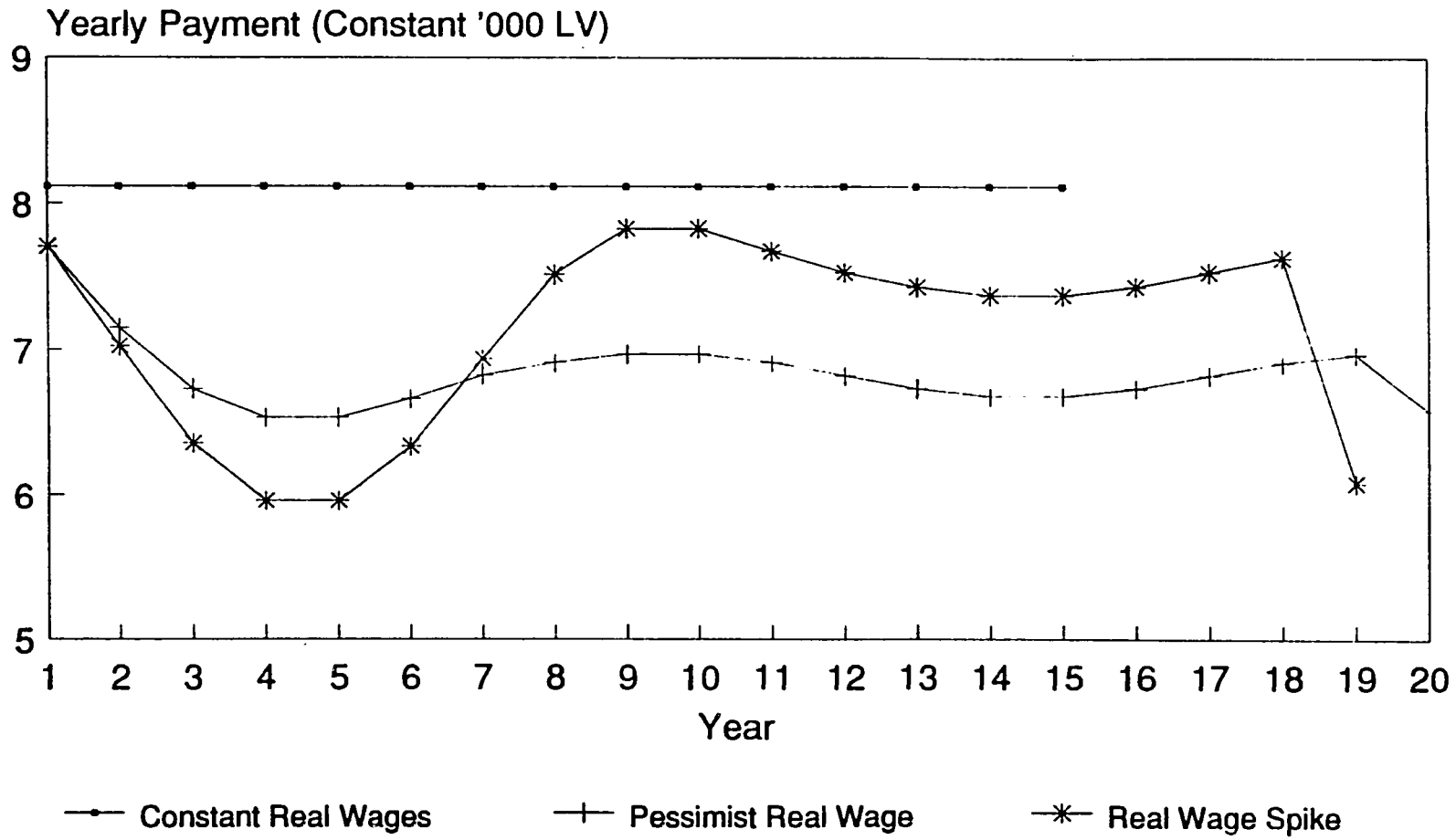
LOAN TERMS

Annual household income (LV)	32,472
Share of income to housing (percent)	25.0
Interest rate (percent)	6.00
Loan term (years)	15
Loan amount (LV)	78,844
Loan-to-value ratio; 50 sq. meter apt (percent)	63.1

	Nominal					Real		
Year	Payment	Interest	Principal	Inflation Adjustment	Loan Balance	Payment	Loan Balance	Payment/ Income (%)
0								
1	18,346	11,267	7,079	(108,945)	180,710	7,703	75,872	25.0
2	34,075	21,685	12,390	(180,710)	349,030	7,153	73,271	25.0
3	54,525	35,601	18,924	(244,321)	574,427	6,733	70,934	25.0
4	79,384	51,698	27,686	(287,214)	833,955	6,535	68,655	25.0
5	111,138	70,052	41,086	(333,582)	1,126,452	6,535	66,239	25.0
6	147,419	87,863	59,556	(337,936)	1,404,832	6,668	63,545	25.0
7	181,109	101,148	79,961	(280,966)	1,605,837	6,827	60,531	25.0
8	201,803	105,985	95,818	(160,584)	1,670,603	6,915	57,247	25.0
9	223,763	110,260	113,503	(167,060)	1,724,160	6,971	53,712	25.0
10	246,139	113,795	132,345	(172,416)	1,764,232	6,971	49,964	25.0
11	268,583	116,439	152,144	(176,423)	1,788,511	6,915	46,046	25.0
12	291,610	118,042	173,568	(178,851)	1,793,794	6,825	41,984	25.0
13	316,610	118,390	198,220	(179,379)	1,774,954	6,737	37,766	25.0
14	345,480	117,147	228,333	(177,495)	1,724,116	6,683	33,350	25.0
15	380,028	113,792	266,236	(172,412)	1,630,291	6,683	28,668	25.0
16	421,382	107,599	313,782	(163,029)	1,479,538	6,736	23,652	25.0
17	469,531	97,650	371,881	(147,954)	1,255,610	6,824	18,248	25.0
18	523,182	82,870	440,312	(125,561)	940,859	6,912	12,430	25.0
19	580,113	62,097	518,017	(94,086)	516,929	6,967	6,209	25.0
20	602,739	34,117	568,622	(51,693)	(0)	6,581	(0)	23.6

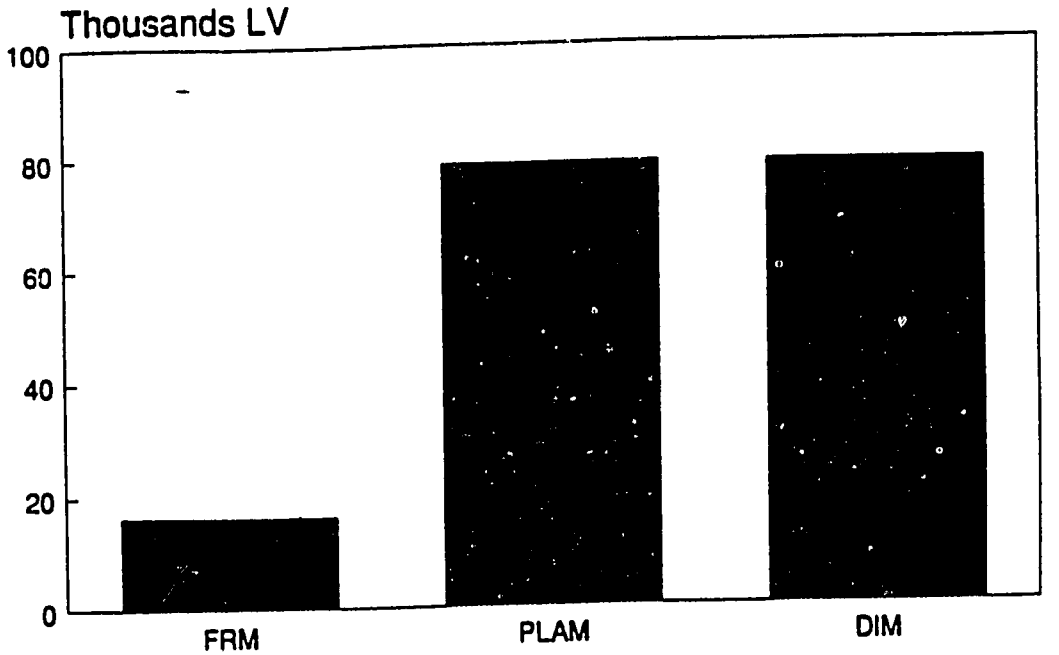
Total real repayments (constant Year 0 LV)	136,874
Lender's real IRR (percent)	6.00

DIM Performance
Under Three Macroeconomic Scenarios

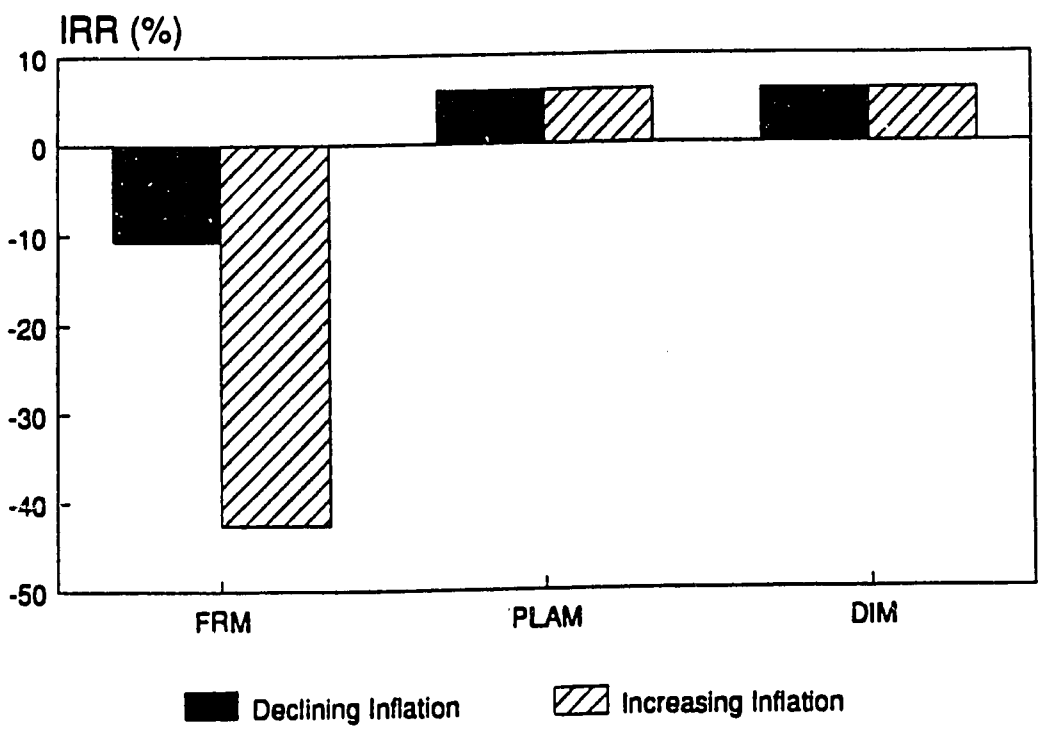


FRM, PLAM and DIM Comparison

Affordable Mortgage Size

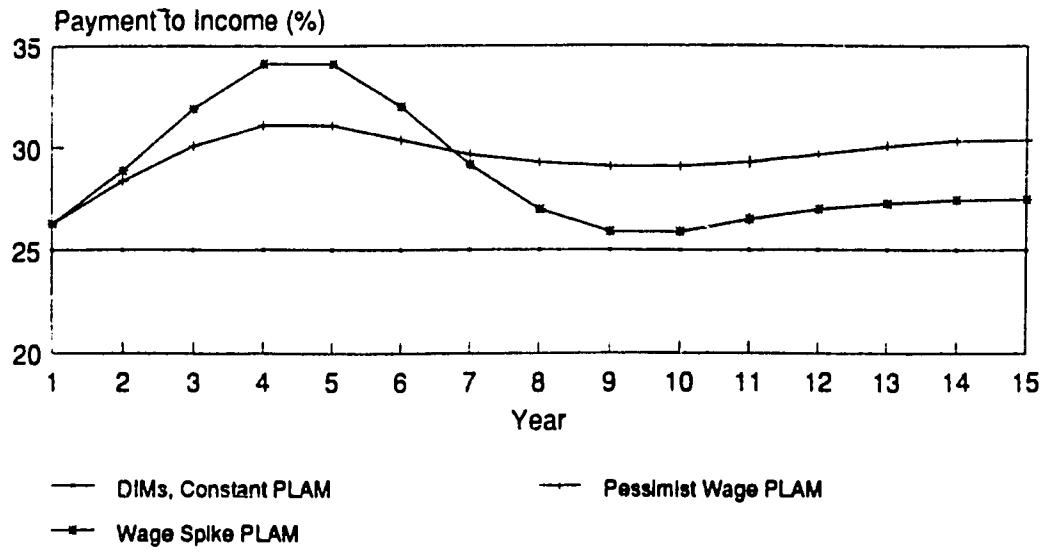


Internal Rate of Return

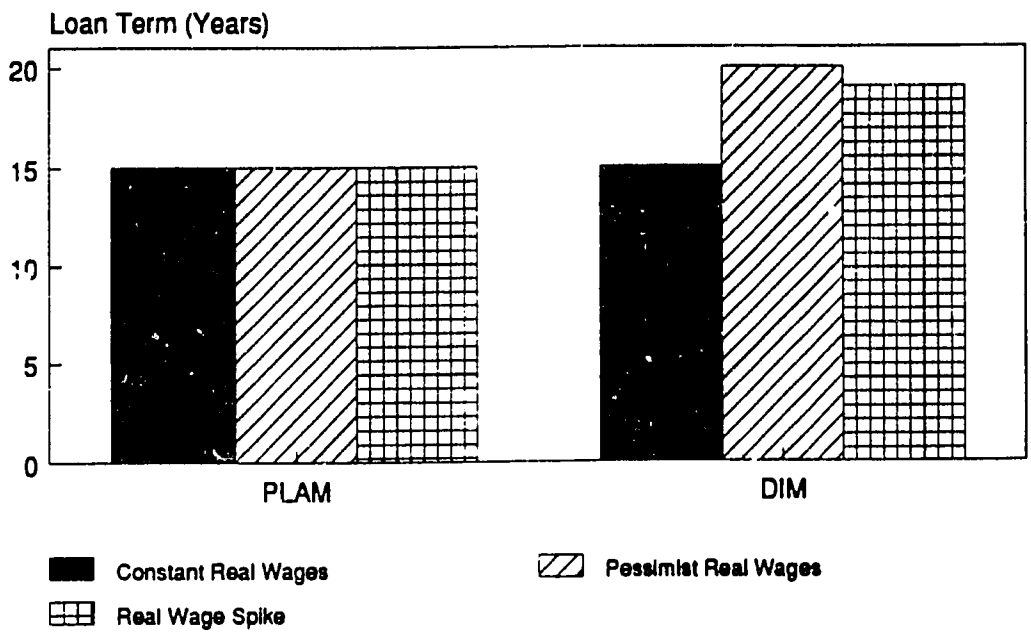


PLAM Versus DIM Comparison

Payment to Income Ratio



Loan Term



13. CONCLUSION

- In comparison to FRMs, DIMs and PLAMs can
  - radically increase loan affordability
  - decrease lender interest rate risk

- Possible Hazards:
  - Fluctuating payment to income ratio for PLAMs
  - Fluctuating loan term for DIMs

- Stress test results
  - Even under very negative macroeconomic conditions both instruments perform relatively well

III. Summary Report of Presentation on Options for Establishing State Savings Bank Profitability under a Positive Real Interest Rate Regime

1. Introduction

Currently the SSB faces a relatively low interest rate on its liabilities and is able to maintain a large interest rate spread between its liabilities and its assets negotiated after January, 1991. Nevertheless, over time competition for deposits and for borrowers will force the SSB to reduce its margins. This paper is a summary of a presentation that demonstrates the impact on SSB profitability of an environment of significantly reduced interest rate margins. This report will also consider alternative means for the bank to achieve an acceptable profitability level.

2. SSB Base Case Profitability

For the purposes of this exercise, we assume the SSB faces a 1.5 percent real cost of funds, inflation is 138 percent per year, the SSB's capital to assets ratio is 7 percent and its asset composition is approximately equivalent to its actual structure in August 1991.[4] We further assume the firm converts its household loans issued after January 1991 into PLAMs and charges a 6 percent real interest rate on them, charges a 6 percent real interest rate on short-term construction loans and a 4.5 percent real rate on its inter-bank loans and continues to charge a 10 to 17 percent nominal rate on its household loans issued before January 1991. Under these conditions, the SSB would have a -5.4 percent real return on assets and a -77.8 real return on equity (ROE).

3. SSB Options for Achieving Satisfactory Profitability

Clearly the SSB could not function with such losses. We therefore consider the bank's options for achieving an acceptable level of profitability. The following four measures each raise the SSB's real ROE from the -77.8 percent resulting from our base case scenario to 5.4 percent. Unless explicitly stated, we assume conditions in the following scenarios are identical to the conditions described above in the base case.

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[4] According to information provided by the SSB, loans to other banks accounted for about two-thirds of SSB assets in that month, loans to households issued after January 1991 accounted for 12 percent of assets, loans to households issued before January were 12 percent of assets and other items were 9 percent of assets.

1. High Real Interest Rate on Loans Issued After 1990. The SSB could achieve a 5.4 percent real ROE by increasing the real interest rate it charged on loans issued after January, 1991. Specifically, the SSB would have to increase the real interest rate it charged on inter-bank loans from 4.5 to 11.8 percent and on household and construction loans from 6 to 13.3 percent. Such very high real rates would significantly reduce mortgage affordability and stymie commercial investment. In effect industry and new borrowers would be providing an enormous subsidy to households with loans issued before 1991.

2. High Nominal Interest Rate on Loans Issued Before 1991. The SSB could also achieve a 5.4 percent real ROE by increasing the nominal interest rate it charges on its loans issued before 1991. With inflation of 138 percent, the firm would have to increase the nominal rate on mortgage loans from 10 to 123 percent and on consumer loans from 17 to 138 percent. Such enormous increases would be unaffordable to many households and would spark widespread default.

3. Reduced Ratio of Loans Issued Before 1991 to Total Assets. The SSB could also achieve satisfactory profitability by reducing the volume of loans issued before 1991 from 12 to 1.9 percent of total assets. It could do this by offering incentives to holders of these loans to prepay their liabilities and/or by increasing the volume of other types of assets. Inducing prepayment on such a large scale would be expensive and difficult.

Over time, these loans' share of total assets will decline without the SSB's taking explicit steps to encourage the process. However, this would be a gradual process and the SSB would suffer heavy losses for some time. The SSB's other option is to significantly expand its resource base. This would allow it to increase lending activity thereby accelerating the erosion of these loans' share of total assets. Nevertheless, the SSB would still suffer heavy losses at least over the short term.

4. Conversion of Loans Issued Before 1991 into PLAMs. This final option calls for the SSB to covert all of its outstanding loans to households into PLAMs. If the SSB wished to continue to favor loans issued before 1991. it could set a real interest rate of 0 percent for these loans verses the 6 percent it charged on loans issued after 1990. If the SSB employed this measure, it would garner a real ROE of 13 percent--verses the target of 5.4 percent. Alternatively, it could obtain a 5.4 percent real ROE and reduce the real interest rate charged

on newer household and inter-bank loans. If loans issued before 1991 were converted to 0 percent interest rate PLAMs, the SSB could charge a real interest rate of 3.8 percent for interbank transactions (verses 4.5 percent in the cases considered above) and 5.3 percent for household loans (verses 6 percent in the above cases) and still retain a 5.4 percent real ROE.

Furthermore, 0 percent interest PLAMs would be very affordable. A family of four with a household income of 32,472 and an outstanding loan balance of 20,000 LV could pay off the loan in 15 years without ever devoting more than 6 percent of family income to mortgage payments even under relatively pessimistic assumptions about future macroeconomic conditions in Bulgaria.

4. Conclusion

This report has reviewed four strategies for the SSB to achieve a healthy level of profitability assuming the firm decides to adopt AMIs for all household loans issued after 1990 and offers a return-matched deposit liability. This analysis has demonstrated that the best means of securing firm profitability under these conditions is to convert all loans issued before 1991 to PLAMs with a 0 percent real interest rate. This strategy has a number of advantages over other schemes considered above. It does not depress new loan demand as does increasing the real interest rate charged on loans issued after 1990. It does not undermine mortgage payment affordability as does raising the nominal interest rate on loans issued before 1991. Finally, this strategy does not require the SSB to suffer initial losses as it would if it attempted to reduce pre-1991 loans' share of total assets.

IV. Presentation on Options for Establishing State Savings Bank Profitability Under a Positive Real Interest Rate Regime

1. Introduction

•The second of two presentations exploring alternative mortgage instruments (AMIs) in the Bulgarian context.

•The first presentation

-compared AMIs to fixed rate mortgages

-Reviewed PLAM and DIM performance under macroeconomic "stress tests"

•This presentation

-Assesses the Impact on SSB profitability of introducing AMIs and a return-matched liability

-Considers Alternative means for achieving acceptable profitability

2. Presentation Overview

1)SSB Profitability under Base Case Assumptions about Interest Rates and Asset Composition

2)Alternative Options for Achieving Satisfactory Profitability

3)PLAM Mortgage Affordability for Pre-1991 Borrowers

4)Conclusion

3. Base Case: Current Asset Composition and Inflation; 1.5% Real COF

	Percentage Points
Real Cost of Funds (COF)	1.5
Inflation	138.0
Capital/Assets	7.0

		Percentage Points			
Asset Type	Percent Total Assets	Real Interest Earned	Cost of Funds	Administration and Default Expense	Profit Spread
Post 1/91 Loans	80.0				
Inter-Bank	67.0	4.5	(1.5)	(0.9)	2.1
Housing/Consumer	12.0	6.0	(1.5)	(1.4)	3.1
ST Construct	1.0	6.0	(1.5)	(1.4)	3.1
Pre 1/91 Loans	12.0				
Housing	9.0	(53.8)	(1.5)	(0.7)	(56.0)
Consumer	3.0	(50.8)	(1.5)	(0.7)	(53.0)
Other	8.0				
Interest Bearing	7.0	1.5	(1.5)	(0.4)	(0.4)
Non-Int Bearing	1.0	(58.0)	(1.5)	(0.4)	(59.9)
Average		-3.0	-1.5	-0.9	-5.4

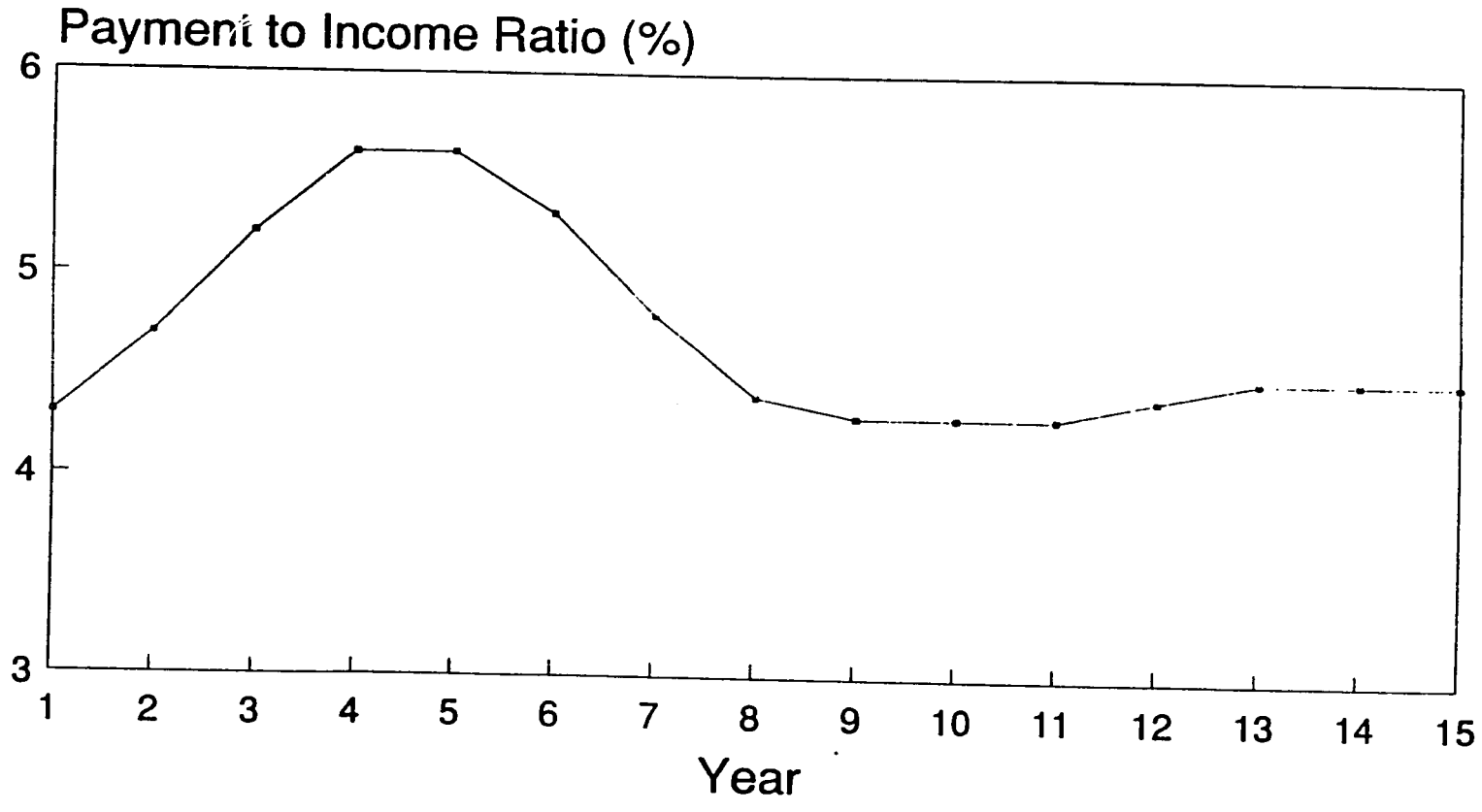
Average Yield on Assets	-5.4
Return on Equity	-77.8

4. Alternative Options for Achieving Satisfactory Profitability at the State Savings Bank

• Each of the options below provides the State Savings Bank a 5.4 percent real return on equity (ROE) assuming the following:
-an inflation rate of 138 percent
-a cost of funds of 1.5 percentage points above inflation
-a capital to assets ratio of 7 percent
-the conversion of all loans made after January, 1991 into PLAMS.

Options	Asset Composition	Mortgage Type and Interest Rate on SSB loans issued before January 1991	Real Interest Rate for Loans Issued after January 1991
Set high real interest rate on post-1990 loans	No Change	Fixed Rate Mortgage Nominal interest rate from 10% to 17%	**Real interest rate of 11.8% to 13.3%**
Set high nominal interest rate on pre-1991 loans	No Change	**Fixed Rate Mortgage Nominal interest rate from 123% to 138%**	Real interest rate of 4.5% to 6%
Reduce pre-1991 loans' share of total assets	**Loans issued before January 1991 reduced from 12% to 1.9% of total asset volume**	Fixed Rate Mortgage Nominal interest rate from 10% to 17%	Real interest rate of 4.5% to 6%
Convert pre-1991 loans to PLAMs	Current	**PLAMS real interest rate of 0%**	Real interest rate of 3.8% to 5.3%

Mortgage Affordability for Outstanding Loans Converted to PLAMs* In Real Wage Spike Macroeconomic Case



*loan size=20,000 lv; income=32,472 lv;
real interest rate=0 percent

6. Conclusion

•If SSB introduces a liability with a real interest rate, the only viable way to insure adequate returns is to convert all outstanding mortgages to PLAMs or DIMs.

•Advantages Over Other Strategies Reviewed
- -New loan demand is not depressed
- -Mortgage affordability is preserved
- -SSB profitability is not undermined

V. Impact of Subsidized Government and Inter-Bank Lending on State Savings Bank Profitability

1. Introduction

Requiring the State Savings Bank to make loans to the government and other banks at subsidized interest rates has a very deleterious effect on SSB profitability. As the tables in the annex of this report indicate, assuming all household loans are converted to PLAMs carrying from a 4 to 6 percent real interest rate, lending to the government at a rate of -1 percent in real terms and to other banks at 2 percent real rate decimates SSB profitability--reducing return on equity to -22 percent from the 23 percent it earns if these loans carry a 4.5 percent real interest rate.

To restore acceptable profitability the government would have to either increase rates on household loans, decrease the share of assets going to these subsidized credits or increase interest rates slightly on these assets.

To achieve acceptable profitability while issuing subsidized-rate loans to the government and financial sector, the SSB would have to increase the proposed real interest rate charged on household loans issued before January 1991 from 4 percent to 10 percent and on loans issued after January 1991 from 6 to 15.4 percent. These high rates would dampen loan affordability, which, in turn, would increase reduce construction-driven economic growth. Furthermore, these rates are unlikely to be sustainable over the medium term. Other banks, unencumbered with the need to cross-subsidize their loans portfolio, will gradually enter the mortgage market and competition will force these artificially high rates down. This process will either destroy SSB financial health or force the bank to radically reduce its subsidies.

Another option for achieving satisfactory profitability is for the SSB to continue subsidizing government and inter-bank loans in the manner indicated above but to reduce their share of total assets from their current 67 percent share to 22 percent. However, this represents a very significant reduction in lending to this group. Thus it would take time to accomplish and would result in these borrowers having to seek funds from other sources that would be unlikely to lend at these low rates.

Finally the SSB could achieve satisfactory profitability by increasing the proposed real interest rates charged on government loans from -1 percent to 2.3 percent and on inter-bank

loans from 2 percent to 3.7 percent.[5] The government could finance the resulting deficit on budget. On budget financing of deficits has the advantage of making these budget shortfalls explicit and easy to measure. Furthermore, it imposes budget accountability. This is the solution the Urban Institute team strongly advocates and the one we feel the World Bank and IMF would also support.

[5] We assume these rates are sufficient to cover administration and credit risk and provide a small margin over cost of funds.

2. Alternative Options for Achieving Satisfactory Profitability at the State Savings Bank

- Each of the options below provides the State Savings Bank a 5.4 percent real return on equity (ROE) assuming the following:
  - an inflation rate of 138 percent
  - a cost of funds of 1.5 percentage points above inflation
  - a capital to assets ratio of 7 percent
  - the conversion of all household loans into PLAMS.

Options	Asset Composition	Real Interest Rate on National Budget and Inter-Bank Loans	Real Interest Rate on Household Loans
Set high real interest rate on household loans	No Change	Real interest rate of -1% to 2%	**Real interest rate of 10 to 15.4%**
Reduce subsidized loans' share of total assets	**Subsidized Loans reduced from 67% to 22.2% of total asset volume**	Real interest rate of -1% to 2%	Real interest rate of 4% to 6%
Increase interest rate on subsidized loans	Current	**Real interest rate of 2.3 to 3.7%**	Real interest rate of 4% to 6%

Source: Team analysis

ANNEX:
WORK TABLES FOR SSB PROFITABILITY ANALYSIS

1. Government Subsidy Base Case

Current Asset Composition and Inflation, 1.5% Real COF

	Percentage Points
Real Cost of Funds (COF)	1.5
Inflation	138.0
Capital/Assets	7.0

Asset Type	Percent Tot Assets	Percentage Points Real Interest	COF	Admin & Default	Profit Spread
Post 1/91 Loans	80.0				
National Budget	50.0	-1.0	1.5	0.3	-2.8
Inter-Bank	17.0	2.0	1.5	0.9	-0.4
Housing/Consumer	12.0	6.0	1.5	1.4	3.1
ST Construct	1.0	6.0	1.5	1.4	3.1
Pre 1/91 Loans	12.0				
Housing	9.0	4.0	1.5	1.4	1.1
Consumer	3.0	4.0	1.5	1.4	1.1
Other	8.0				
Interest Bearing	7.0	1.5	1.5	0.4	-0.4
Non-Int Bearing	1.0	-58.0	1.5	0.4	-59.9
Average		1.1	0.8	0.5	-1.6

Average Yield on Assets	-1.6
Return on Equity	-22.3

2. Unsubsidized Base Case

Current Asset Composition and Inflation, 1.5% Real COF

	Percentage Points
Real Cost of Funds (COF)	1.5
Inflation	138.0
Capital/Assets	7.0

Asset Type	Percent Tot Assets	Percentage Points Real Interest	COF	Admin & Default	Profit Spread
Post 1/91 Loans	80.0				
National Budget	50.0	4.5	1.5	0.3	2.7
Inter-Bank	17.0	4.5	1.5	0.9	2.1
Housing/Consumer	12.0	6.0	1.5	1.4	3.1
ST Construct	1.0	6.0	1.5	1.4	3.1
Pre 1/91 Loans	12.0				
Housing	9.0	4.0	1.5	1.4	1.1
Consumer	3.0	4.0	1.5	1.4	1.1
Other	8.0				
Interest Bearing	7.0	1.5	1.5	0.4	-0.4
Non-Int Bearing	1.0	-58.0	1.5	0.4	-59.9
Average		1.6	0.8	0.5	1.6

Average Yield on Assets	1.6
Return on Equity	23.1

3. Base Case with Subsidized Inter-Bank and Government Loans

Current Asset Composition and Inflation, 1.5% Real COF

	Percentage Points
Real Cost of Funds (COF)	1.5
Inflation	138.0
Capital/Assets	7.0

Asset Type	Percent Tot Assets	Percentage Points Real Interest	COF	Admin & Default	Profit Spread
Post 1/91 Loans	80.0				
National Budget	50.0	-1.0	1.5	0.3	-2.8
Inter-Bank	17.0	2.0	1.5	0.9	-0.4
Housing/Consumer	12.0	6.0	1.5	1.4	3.1
ST Construct	1.0	6.0	1.5	1.4	3.1
Pre 1/91 Loans	12.0				
Housing	9.0	4.0	1.5	1.4	1.1
Consumer	3.0	4.0	1.5	1.4	1.1
Other	8.0				
Interest Bearing	7.0	1.5	1.5	0.4	-0.4
Non-Int Bearing	1.0	-58.0	1.5	0.4	-59.9
Average		1.1	0.8	0.5	-1.6

Average Yield on Assets	-1.6
Return on Equity	-22.3

4. Subsidized Government Loans and High Interest Rates for Households

Current Asset Composition and Inflation, 1.5% Real COF

	Percentage Points
Real Cost of Funds (COF)	1.5
Inflation	138.0
Capital/Assets	7.0

Asset Type	Percent Tot Assets	Percentage Points Real Interest	COF	Admin & Default	Profit Spread
Post 1/91 Loans	80.0				
National Budget	50.0	-1.0	1.5	0.3	-2.8
Inter-Bank	17.0	2.0	1.5	0.9	-0.4
Housing/Consumer	12.0	15.4	1.5	1.4	12.5
ST Construct	1.0	15.4	1.5	1.4	12.5
Pre 1/91 Loans	12.0				
Housing	9.0	10.0	1.5	1.4	7.1
Consumer	3.0	10.0	1.5	1.4	7.1
Other	8.0				
Interest Bearing	7.0	1.5	1.5	0.4	-0.4
Non-Int Bearing	1.0	-58.0	1.5	0.4	-59.9
Average		3.1	0.8	0.5	0.4

Average Yield on Assets	0.4
Return on Equity	5.4

5. Government Subsidy Loans Reduced Share of Total Assets

Current Asset Composition and Inflation, 1.5% Real COF

	Percentage Points
Real Cost of Funds (COF)	1.5
Inflation	138.0
Capital/Assets	7.0

Asset Type	Percent Tot Assets	Percentage Points Real Interest	COF	Admin & Default	Profit Spread
Post 1/91 Loans	58.5				
National Budget	16.5	-1.0	1.5	0.3	-2.8
Inter-Bank	5.7	2.0	1.5	0.9	-0.4
Housing/Consumer	33.5	6.0	1.5	1.4	3.1
ST Construct	2.8	6.0	1.5	1.4	3.1
Pre 1/91 Loans	33.5				
Housing	25.1	4.0	1.5	1.4	1.1
Consumer	8.4	4.0	1.5	1.4	1.1
Other	8.0				
Interest Bearing	7.0	1.5	1.5	0.4	-0.4
Non-Int Bearing	1.0	-58.0	1.5	0.4	-59.9
Average		3.2	1.3	1.1	0.4

Average Yield on Assets	0.4
Return on Equity	5.4

6. Low Rate Government Loans and Base Interest Rates for Households

Current Asset Composition and Inflation, 1.5% Real COF

	Percentage Points
Real Cost of Funds (COF)	1.5
Inflation	138.0
Capital/Assets	7.0

Asset Type	Percent Tot Assets	Percentage Points Real Interest	COF	Admin & Default	Profit Spread
Post 1/91 Loans	80.0				
National Budget	50.0	2.3	1.5	0.3	0.5
Inter-Bank	17.0	3.7	1.5	0.9	1.3
Housing/Consumer	12.0	6.0	1.5	1.4	3.1
ST Construct	1.0	6.0	1.5	1.4	3.1
Pre 1/91 Loans	12.0				
Housing	9.0	4.0	1.5	1.4	1.1
Consumer	3.0	4.0	1.5	1.4	1.1
Other	8.0				
Interest Bearing	7.0	1.5	1.5	0.4	-0.4
Non-Int Bearing	1.0	-58.0	1.5	0.4	-59.9
Average		1.4	0.8	0.5	0.4

Average Yield on Assets	0.4
Return on Equity	5.4

VI. Comparison of Mortgage Instrument Performance for Actual SSB Loan Cases Under Alternative Macroeconomic Scenarios

1. Introduction

This memo is a component of an ongoing study of the feasibility of introducing Price Level Adjusted Mortgages (PLAMs) and/or Dual Index Mortgages (DIMs) in Bulgaria. This report examines the performance of these instruments and the fixed rate mortgage (FRM) for actual and potential SSB loans under two potential macroeconomic situations.

2. Loans Types

This review will examine the performance of the FRM, PLAM and DIM for an actual loan issued before 1991, an actual loan issued in 1991 and a hypothetical loan issued in 1992. The loan issued before 1991, referred to below as the "old" loan, currently has an outstanding balance of LV7,032 and 21 years remaining in the loan term. The household holding the loan has an annual income of LV10,800. We assume the family faces a 36 percent nominal interest rate[6] if this loan is amortized over a fixed rate schedule and a 4 percent real rate if the loan is amortized as a PLAM or DIM. The loan issued in 1991, referred to below as the "current" loan, has a LV14,000 balance and a 15 year term. The family holding the loan has a LV14,000 yearly income. We assume they face a 54 percent nominal interest rate under the FRM and a 6 percent real rate under the PLAM and DIM. The hypothetical loan issued in 1992, referred to below as the "future" loan, is assumed to be for LV70,000 and have a 20 year term. The borrower family is assumed to have an annual income of LV48,000. They face a 54 percent nominal interest rate on the FRM and a 6 percent real interest rate on the PLAM and DIM. The characteristics of these three loans are summarized below.

[6] Two-thirds the Bulgarian National Bank's base rate of 54 percent.

Loans Used in Mortgage Instrument Analysis

Characteristics	Old	Current	New
Family Income (LV)	10,800	14,000	48,000
Initial Loan Balance	7,032	14,000	70,000
Term (Years)	21	15	20
Interest Rate for FRM (Nominal)	36	54	54
Interest Rate for PLAM and DIM (Real)	4	6	6

3. Macroeconomic Scenarios

This analysis reviews the maximum payment to income ratios and loan terms which would result if each of the three loans above were repaid under PLAMs, DIMs and FRMs. The performance of these instruments depends in part on macroeconomic conditions. This analysis considers mortgage product performance under two macroeconomic scenarios. The first scenario, referred to below as the "constant real wage" case, assumes that inflation begins at 138 percent per year in the first year of loan amortization and gradually declines, leveling off at 10 percent per year by year eight. It further assumes that wage growth always exactly follows growth in prices. The second scenario, referred to below as the "pessimistic real wage" case assumes that inflation follows the same pattern described above for the constant real wage case but that wages first increase slower than inflation and then fluctuate around inflation such that real wages fall to about 80 percent of their initial level by the end of the fourth year of the loan term and then fluctuate between 80 and 85 percent of their initial level.

Mortgage Instrument Performance

As the following table indicates, PLAMs and DIMs significantly outperform FRMs in terms of maximum payment to income ratios. For most loans, PLAMs yield maximum payment to income ratios one-half or less of those for FRMs; and DIM ratios are significantly

below PLAMs' under the pessimistic real wage case. PLAMs and FRMs always have the same loan term. The term for DIMs varies inversely with real wages and under the pessimistic real wage case, loan term was one-third to one-half longer for DIMs than for FRMs and PLAMs. The following table details these findings.

Comparison of FRM, DIM and PLAM Performance

Loan Type	Macroeconomic Scenario	Mortgage Product	Maximum Payment/ Income (%)	Term
Old	Constant Real Wage	FRM	9.9	21
Old	Constant Real Wage	PLAM	4.6	21
Old	Constant Real Wage	DIM	4.6	21
Old	Pessimistic Real Wage	FRM	10.4	21
Old	Pessimistic Real Wage	PLAM	5.8	21
Old	Pessimistic Real Wage	DIM	4.6	28
Current	Constant Real Wage	FRM	22.7	15
Current	Constant Real Wage	PLAM	10.3	15
Current	Constant Real Wage	DIM	10.3	15
Current	Pessimistic Real Wage	FRM	23.9	15
Current	Pessimistic Real Wage	PLAM	12.8	15
Current	Pessimistic Real Wage	DIM	10.3	20
Future	Constant Real Wage	FRM	33.1	20
Future	Constant Real Wage	PLAM	12.7	20
Future	Constant Real Wage	DIM	12.7	20
Future	Pessimistic Real Wage	FRM	34.9	20
Future	Pessimistic Real Wage	PLAM	15.8	20
Future	Pessimistic Real Wage	DIM	12.7	29

5. Conclusion

As this analysis demonstrates, for loans of equal sizes, PLAMs and DIMs generally

have much lower maximum payment to income ratios than FRMs. This occurs because the former two instruments allow borrowers to spread payments relatively evenly over the life of the loan, while payments are concentrated in the initial years of the loan for FRMs. Nevertheless, FRM performance is unaffected by the macroeconomic conditions prevailing during loan amortization. In contrast, during periods of declining real wages, PLAM payment to income ratios increase while under the DIM, loan term is extended.

VII. Credit Risk for the PLAM and DIM in Bulgaria During Periods of Decline in Real Property Values

1. Introduction

This memo is a small component of an ongoing study of the feasibility of introducing Price Level Adjusted Mortgages (PLAMs) and/or Dual Index Mortgages (DIMs) in Bulgaria. This report examines the credit risk lenders face when they underwrite PLAMs and DIMs during periods of decline in real property values.

2. Assumptions for Credit Risk Model

For the purposes of this review, we assume that a family earning 32,472 LV per year can devote 25 percent of their income to mortgage payments and that they take out a 15 year PLAM or DIM loan at a 6 percent real interest rate. This family would be able to afford a 78,844 LV loan. Assuming they made a 20 percent downpayment on their unit, they would be able to purchase a 98,550 LV home. Finally, we assume that the real value of the property gradually declines over the first seven years of the loan amortization, such that, by the end of the seventh year, the property is worth only 50 percent of its initial value in real terms.

3. Credit Risk for Price Level Adjusted Mortgages

Under the PLAM, the banks' potential real losses from borrower default are affected only by real property prices. As long as the relationship between general inflation and property values is maintained, credit risk does not vary with inflation. The following table illustrates the results of this analysis for a PLAM. As the table indicates, even assuming a relatively high loan-to-value ratio and a decline in the real value of property to 55 percent of its initial level over a five year period, the bank's credit risk under the PLAM is quite low. In fact, the bank never stands to lose more than 9 percent of the loan balance outstanding if the borrower defaults and the bank is forced to resell the home.[7]

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[7] This analysis does not take into account the bank's transaction costs of repossessing the unit and selling it.

Bank Credit Risk for PLAM Loans

Year	Loan Balance	Real Estate Real Price Index	Nominal Value of Property	Gain or Loss from Bank Sale	Gain or Loss as % of Loan
		100	98,555		
1	179,721	90	211,263	31,542	18%
2	342,338	80	375,578	33,240	10%
3	551,154	70	558,673	7,519	1%
4	777,724	60	718,293	-59,431	-8%
5	1,016,089	55	921,810	-94,279	-9%
6	1,220,701	52	1,132,988	-87,713	-7%
7	1,337,367	50	1,307,294	-30,073	-2%
8	1,322,467	50	1,438,023	115,554	9

Source: Team Analysis

4. Credit Risk for Dual Index Mortgages

Under the DIM, banks' credit risk is influenced by both real property values and real wages. Bank losses from borrower default increase as wages and/or property values lag general price increases. Nevertheless, even assuming that real wages fall to less than 75 percent of their initial level over a five year period[8] and property values fall to 55 percent of their initial level over the same period, real bank losses from the sale of repossessed units never exceed 22 percent of the loan balance outstanding.[9]

[8] The model used to define real wages for this analysis is the "Real Wage Spike" macroeconomic scenario detailed in the Performance of Alternative Mortgage Instruments presentation and report.

[9] As in the PLAM analysis above, this figure does not take into account the costs incurred for repossession and sale of the unit.

Bank Credit Risk for DIM Loans

Year	Loan Balance	Real Estate Real Price Index	Real Wage Index	Value of Property	Gain or Loss From Bank Sale Of Unit	Gain or Loss as % of Loan
0	78,844	100	100	98,555		
1	180,710	90	95	211,263	30,553	17%
2	454,525	80	87	488,252	33,727	7%
3	1,327,265	70	78	1,281,661	-45,604	-3%
4	4,536,757	60	73	3,844,982	-691,775	-15%
5	19,012,742	55	73	15,155,638	-3,857,104	-20%
6	66,173,893	52	78	51,584,281	-14,589,611	-22%
7	189,476,820	50	85	148,800,812	-40,676,008	-21%
8	427,548,846	50	93	357,121,949	-70,426,898	-16%
9	753,247,970	50	96	678,531,703	-74,716,267	-10%
10	1,035,911,162	50	96	1,017,797,554	-18,113,608	-2%
11	1,221,484,961	50	95	1,323,136,820	101,651,859	8%

Source: Team Analysis

5. Conclusion

This report demonstrates that even under quite pessimistic assumptions about real property values, credit risk is very low for PLAMs. Credit risk for DIMS is significantly greater than that for PLAMs when real wages are falling. Nevertheless, banks do not stand to lose prohibitive sums on the repossession of DIM-financed units except in periods of very rapid decline in real wages and real property values.