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ANALYSIS OF CREDIT AFFORDABILITY AND CAPITAL CONSERVATION FOR THE STARA ZAGORA INVESTMENT FUND

BULGARIA

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Abstract

The government of Stara Zagora plans to use proceeds from privatization to create a credit facility for small businesses. This report analyzes how alternative interest rate scenarios and amortization methods would affect credit affordability and the facility's capital conservation. This analysis demonstrates that indexing interest rates to inflation results in better fund conservation than indexing rates to the inter-bank lending rate, without significantly undermining loan affordability. Equal installment amortization significantly increases payment affordability but does not greatly depress the real value of the investment fund as compared to equal installment amortization.

INTRODUCTION

The government of Stara Zagora plans to use proceeds from privatization to create a credit facility for small businesses. The city government requested assistance in analyzing how alternative interest rate scenarios and amortization methods would affect credit affordability and the facility's capital conservation. A loan instrument expert worked in Stara Zagora and undertook follow-up analyses to comply with this request.

The expert met with Mr. Petko Zhelev, Chairman of the board of the Investment Fund, and Mr. Petko Vliev, Director of the Fund. In addition, the expert met twice with the full board of the Fund. In the first meeting, basic assumptions were established and interest rate scenarios agreed upon. In the second meeting, the expert presented the results of the analysis. Based on these findings and procedures currently employed by Stara Zagora bankers, the fund requested that additional analyses be performed. The expert explained the mechanics of the computer model and reviewed its use with Mr. Zhelev.

Copies of the presentations based on these analyses submitted to the board are included in annexes 1 and 2 of this report.

In addition, the expert discussed with Mr. Vliev fund management's plans for basic procedures and criteria for evaluating business proposals. Annex 3 is a summary of this discussion.

Assumptions for Interest Rate and Amortization Scenario Analyses

To analyze Fund affordability and capital conservation, the board of directors agreed to the following assumptions: an average real loan size of Lv. 1 million; a 6 month grace period during which interest accrues but no payment is made; a repayment period of three years and annual fund expenses equal to 20 percent of interest income. Borrowers are assumed to be able to devote 15 percent of their sales to repayments. It was further assumed that total contributions to the fund would equal Lv. 400 million in real terms, distributed across time as follows: 10 percent in the first year of fund operation, 20 percent in the second, 40 percent in the third, 20 percent in the fourth, and 10 percent in the fifth. The central bank base interest rate was assumed to be a fixed 59 percent of the inflation rate. Inflation was assumed to be 100 percent for the first two years of fund operation and to decline slowly thereafter.

Interest Rate and Amortization Scenarios for First Analysis

In the first analysis, credit affordability and fund capital conservation were reviewed for four interest rate scenarios: interest as a fixed 40 percent of inflation; interest as a fixed 40 percent of the central bank base rate; interest as an increasing percent of inflation; and interest as an increasing percent of the base rate. To simplify the analysis, loans were amortized on an annual basis.

Summary of Results from First Interest Rate and Amortization Scenario Analysis

This section compares payment affordability and fund capital conservation when the inflation rate is used as an interest index versus when the base rate is used as an interest index. In addition it compares the use of a fixed index versus an increasing index. The presentation that reviews this analysis forms Annex 1 of this report.

Inflation Index Versus Bulgarian National Bank Base Rate Index. Using an interest rate equal to 40 percent of inflation results in a first month's payment 30 percent higher than the first month's payment that results when the interest rate is 40 percent of the BNB base rate. The first month's payment is also about 30 percent higher when the interest rate is an increasing percent of inflation versus when it is an increasing percent of the base rate. However, given the 6 month grace period before repayments begin, the real value of the first month's payment under all scenarios is only about 75 percent of its value in the absence of a grace period. Thus, the real value of the first month's payment when interest is indexed to inflation is about the same size as the nominal first payment when interest is indexed to the base rate.

Use of the inflation index enables the fund to conserve its capital more effectively. Under any interest scenario, the fund will receive about Lv. 400 million in capital from the city's privatization effort. Thus, assuming an average real loan size of Lv. 1 million, a total of 400 loans can be made with the initial capital. In addition, 340 to 385 loans funded exclusively by loan repayments can be made in the first 15 years of fund operation if an inflation index is used, compared to only about 245 loans if the base rate index is used.

Loan affordability is higher and fund conservation lower when the base rate is used as an index in this analysis because we have assumed that the base rate retains its current relationship to inflation, that is, that it remains equal to approximately 59 percent of inflation. Given this assumption, the same affordability and fund conservation results can be obtained by assuming an interest rate equal to 40 percent of inflation or an interest rate equal to 68 percent of the base rate.

Nevertheless, in practice the central bank base rate's relationship to inflation varies significantly over time. Thus, using an interest rate indexed to the base rate will be a very imperfect approximation of the affordability and fund conservation results that will be obtained if the interest rate is indexed directly to inflation.

Using the inflation rate as an index can be more complex to administer than using the base rate. The inflation rate is more volatile than the base rate, statistics are reported with a one month lag, and many people believe that government statistics on the inflation rate are unreliable.

To compensate for these problems, the fund could agree that regardless of the movement in inflation, interest rates would be changed only on a quarterly basis. Furthermore, loan contracts could state that interest rates would be based on lagged inflation data. For example, the interest rate for the second quarter of 1994 could be set based on the average inflation rate prevailing during the first quarter of 1994. Finally, while many people doubt the accuracy of government inflation statistics, the complaint is invariably that these figures are too low. As lower than actual inflation figures would result in a reduced payment burden for borrowers, it is unlikely that they would complain about the use of official figures.

Increasing Interest Rate Versus Constant Interest Rate. An increasing interest index loan is more affordable for borrowers and preserves the value of the fund better than a fixed index loan. Nevertheless, these benefits are relatively modest in size.

For example, we compared a loan with an interest rate equal to 40 percent of inflation and a loan with an interest rate that equaled 20 percent of inflation during the grace period, 40 percent of inflation during the first year of loan repayment, 80 percent of inflation during the second year of repayment, and 100 percent of inflation thereafter. The first payment on the increasing interest loan was 8 percent lower than the payment on the loan with a fixed interest rate. The third year's payment on the increasing rate loan was considerably larger than the third year's payment on the fixed percent loan. Nevertheless, in real terms, both third year payments were less than one-half of the size of the first year's payments. Thus, later year affordability is unlikely to be an issue for someone who can afford the initial payments.

The increasing interest rate loan was also more effective at preserving the real value of the fund. Over the first 15 years of the life of the fund, the increasing interest loan allowed for 12 percent more loan to be made with funds generated from loan repayments than the fixed interest loan.

Similarly, when an interest rate fixed at 40 percent of the base rate was compared with an interest rate that increased as a percent of the base rate over time, the increasing interest rate was found to have an initial payment about 5 percent lower and to yield about 8 percent more new loans.

Thus, increasing interest loans enhance affordability and promote fund conservation. Nevertheless, the administrative burden of managing increasing

interest loans and the complexity of explaining these loans to customers must be weighed against the relatively modest benefits they offer.

Interest Rate and Amortization Scenarios for Second Analysis

In the second analysis, credit affordability and fund capital conservation were analyzed for four interest rate and amortization scenarios: 1) interest as a fixed 40 percent of inflation and equal monthly installment (EMI) amortization;[1] 2) interest as a fixed 40 percent of inflation and equal principal (EP) amortization;[2] 3) interest as a fixed 40 percent of the central bank base rate and EMI amortization; and 4) interest as a fixed 40 percent of the central bank base rate and EP amortization. Loans were amortized on a monthly basis.

Summary of Results from Second Interest Rate and Amortization Scenario Analysis

This section compares payment affordability and fund capital conservation when the inflation rate is used as an interest index versus when the base rate is used as an interest index. In addition it compares the use of equal monthly installment amortization versus equal principal amortization. The presentation reviewing these findings forms
Annex 2 of this report.

Inflation Index Versus Bulgarian National Bank Base Rate Index. The results of the comparison between the performance of an inflation-based interest rate and an interest rate based on the central bank's base rate under monthly amortization are very similar to the results obtained under yearly amortization regardless of whether EMI or EP amortization is used. Under EP amortization, the first year's repayment if the interest rate is 40 percent of inflation is about 31 percent higher than if the interest rate is 40 percent of the base rate. Under EMI amortization, the first year's repayment if the interest rate is 40 percent of inflation is about 24 percent higher than if the interest rate is 40 percent of the base rate. The number of

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[1] Under equal monthly installment amortization, payments are composed of a gradually increasing principal payment and a gradually decreasing interest payment. A payment is set such that if the interest rate does not change, the borrower will pay the same amount each period, and the full value of the loan will be repaid over the specified term.

[2] Equal principal amortization requires the borrower to make a principal payment of equal size each period. Interest payments are based on outstanding principal. The result is that the payment declines over time since each payment is composed of a constant principal payment and a declining interest payment.

additional loans that can be made with repayments is 28 to 31 percent higher if inflation is used as an index than if the base rate is used as an index.

Equal Monthly Installment Amortization Versus Equal Principal Amortization. An equal monthly installment amortization scheme significantly increases payment affordability without significantly undermining loan fund conservation. In this example, the first month's payment under EMI amortization is 24 percent lower than the first month's payment under EP amortization if the inflation index is used. If the base rate index is used, the first EMI payment is 17 percent lower than the first EP payment.

EMI payments remain constant if interest rates do not change, whereas EP payments decline. For these examples, by the 25th month of repayment, EP payments are 9 to 14 percent lower than EMI payments. Nevertheless, the EMI payments have declined to only about one-fourth of their initial level in real terms. Thus, while the borrower benefits from later payments' increased affordability under the EP, this benefit is not required to insure repayment affordability. Because higher payments are received earlier under the EP than under the EMI, the real value of payments is better preserved. Nevertheless, this benefit is relatively small. For this example, 5 to 8 percent more loans can be made with EP amortization than with EMI amortization.

Thus EMI amortization significantly increases payment affordability but does not greatly depress the real value of the fund as compared to EP amortization.

ANNEX 1:
FIRST PRESENTATION OF
ANALYSIS OF AFFORDABILITY AND
CAPITAL CONSERVATION FOR
THE STARA ZAGORA INVESTMENT FUND

February 19, 1993

Assumptions

Average loan size	Lv. 1 million
Grace period	0.5 years
Repayment period	3.0 years
Fund size	Lv. 400 million
Fund distribution over time:	
First year	10%
Second year	20%
Third year	40%
Fourth year	20%
Fifth year	10%
Fund expenses as % interest income	20%
Ratio of the Base Rate to inflation is constant over time	

Interest Rate Scenarios

1. Fixed at 40% of inflation

2. Fixed at 40% of central bank base rate

3. Increasing % of inflation:

   20% of inflation during grace period
   40% of inflation for first repayment year
   80% of inflation for second repayment year
   100% of inflation for third repayment year

4. Increasing % of BNB Base Rate:

   20% of BNB base rate during grace period
   40% of BNB base rate for first repayment year
   80% of BNB base rate for second repayment year
   100% of BNB base rate for third repayment year

Figure 1: Inflation Scenario

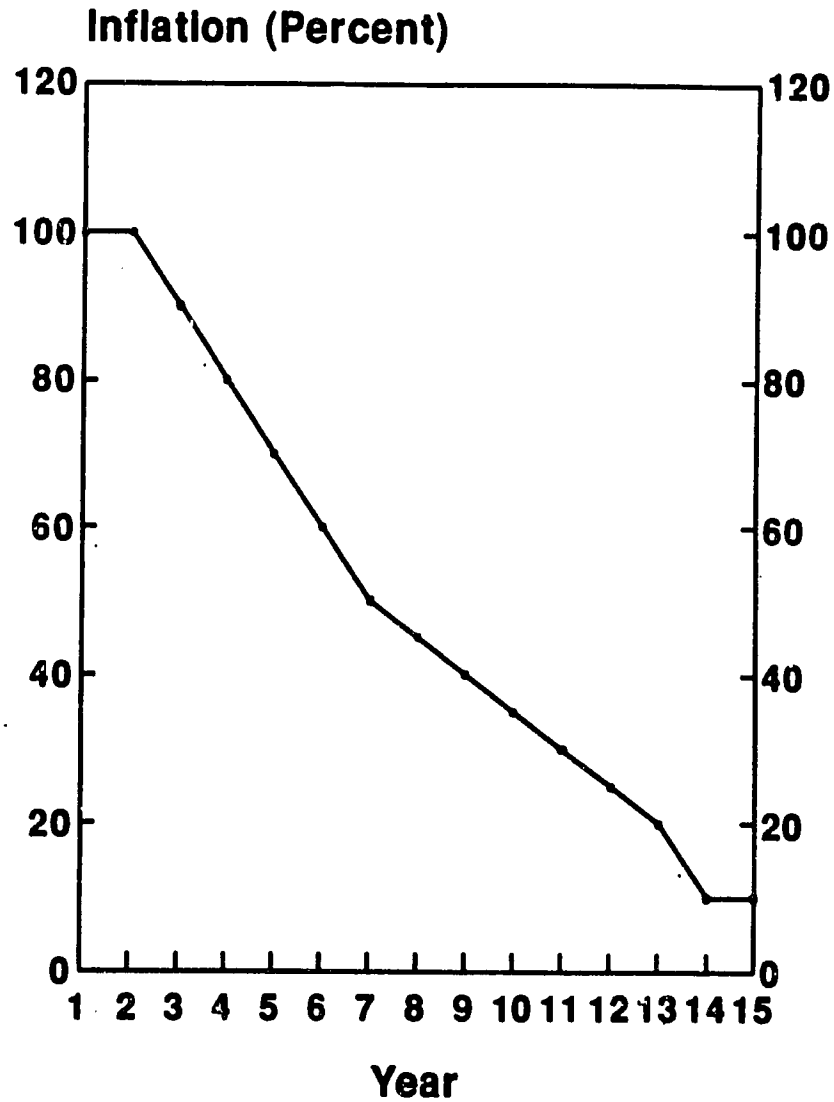
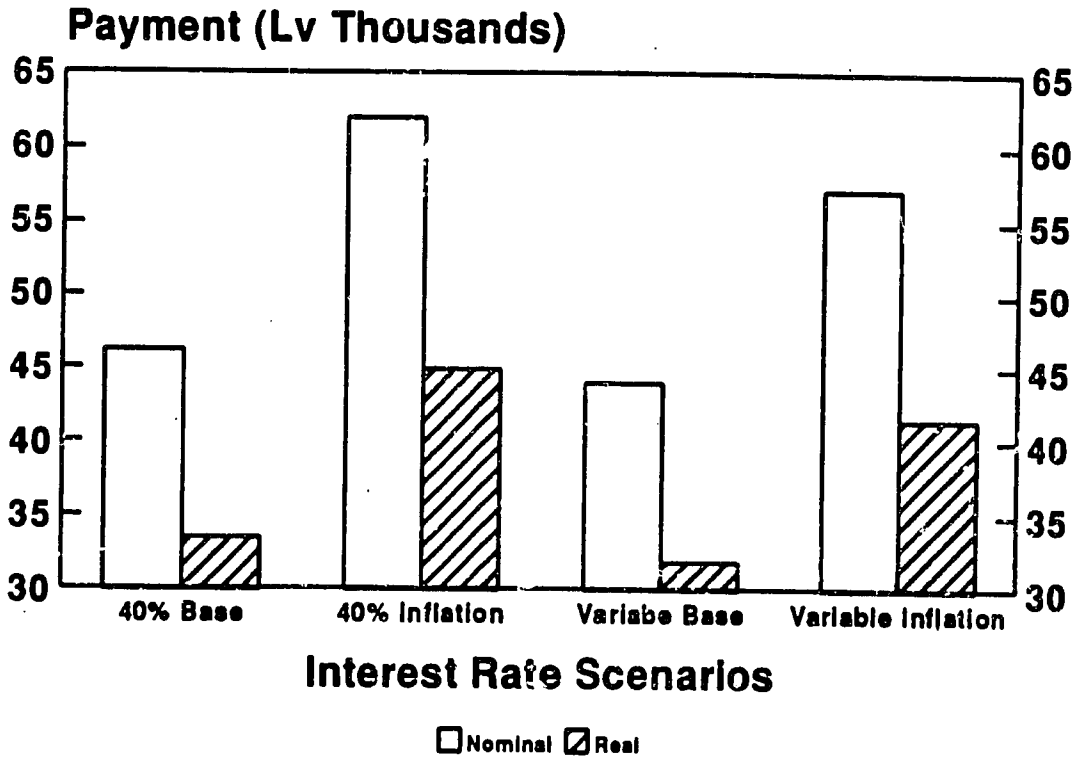
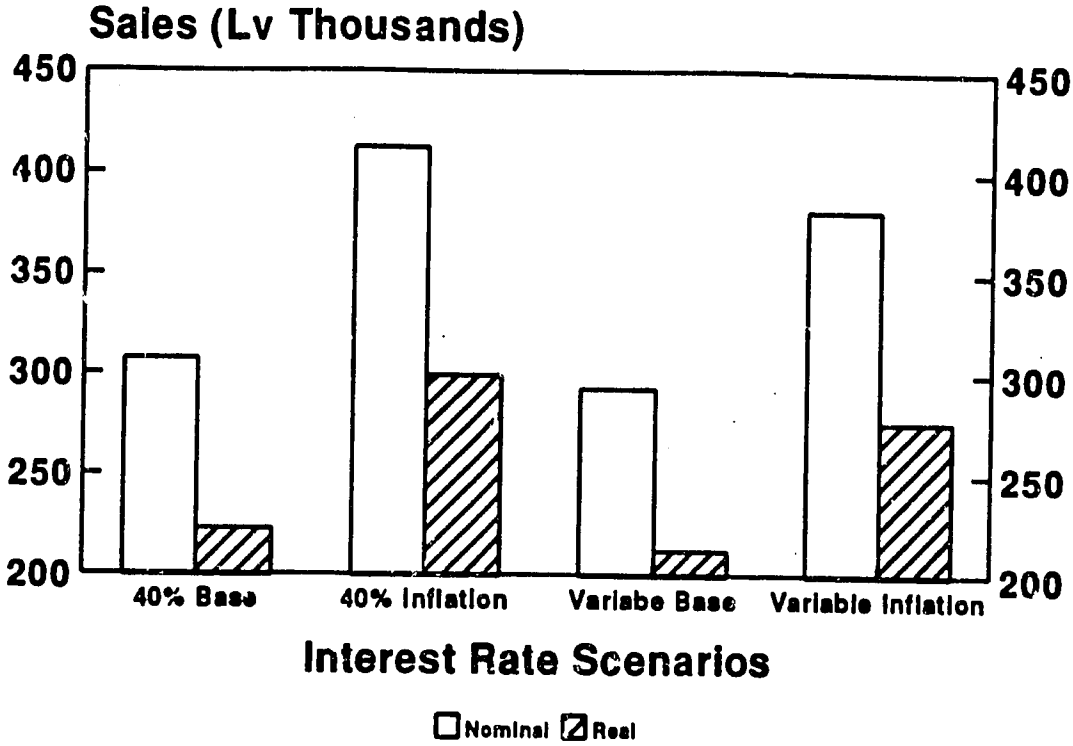


Figure 2: Size of First Month's Payment Under Alternative Interest Rate Assumptions



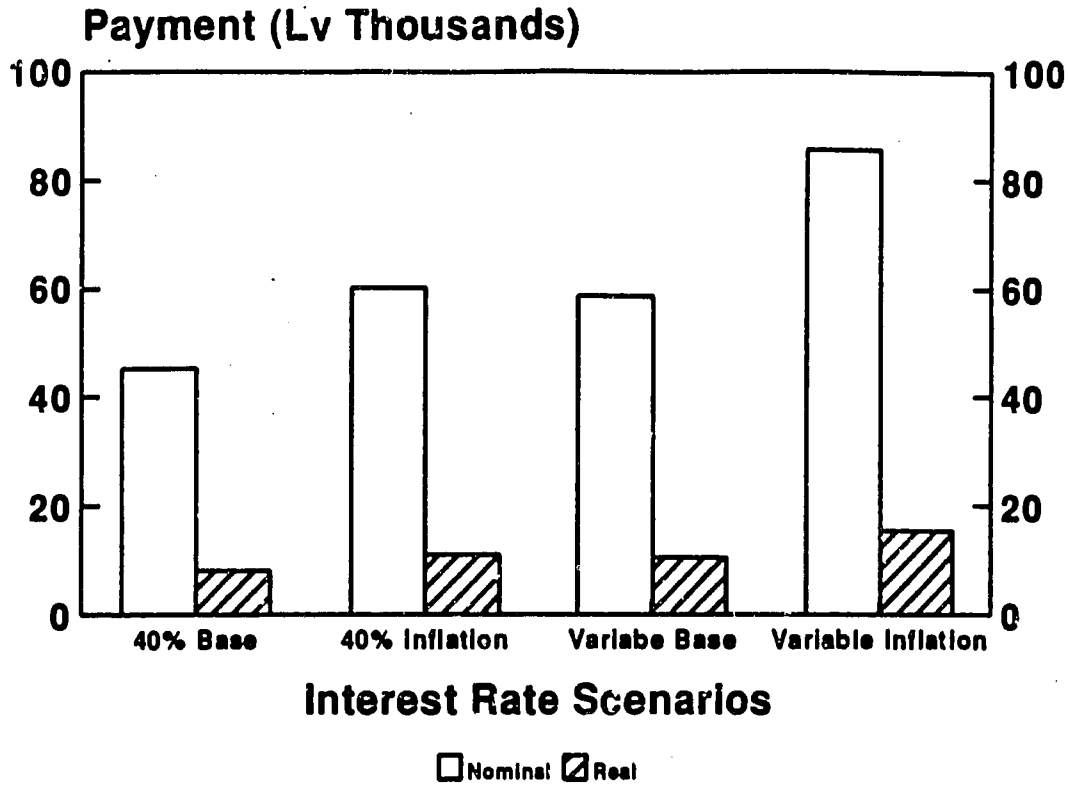
*Assumes an average loan size of Lv. 1 Million

Figure 3: Size of Required First Month's Sales Under Alternative Interest Rate Assumptions



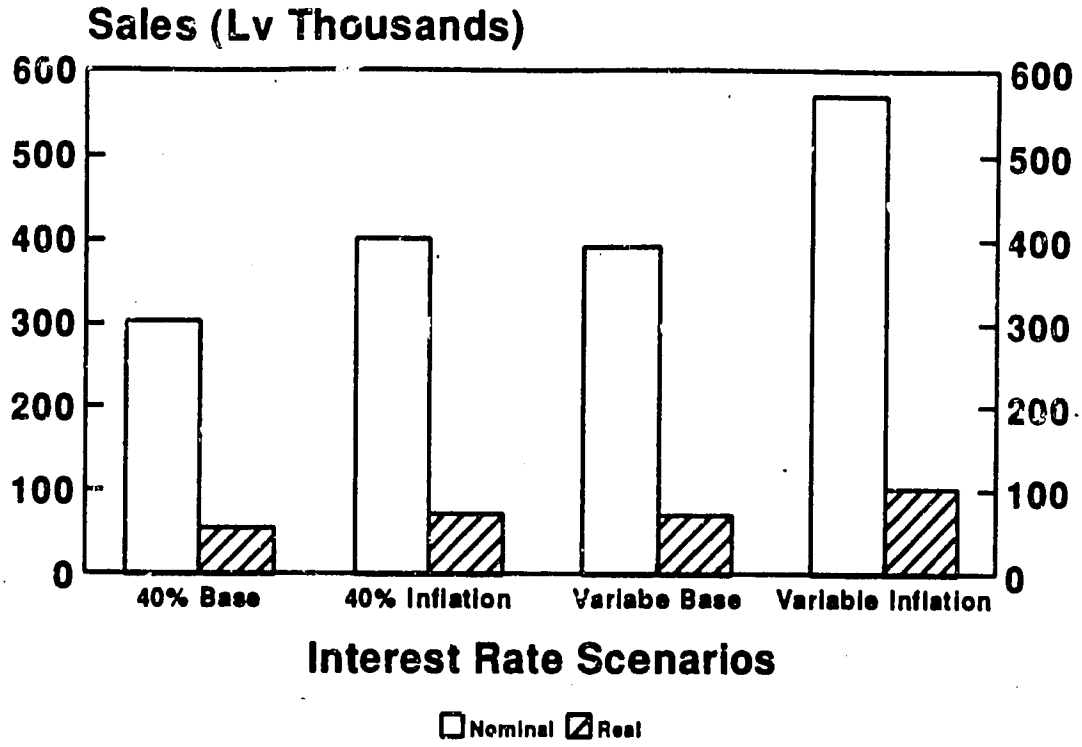
*Assumes an average loan size of Lv. 1 Million and that no more than 15% of sales is used for loan repayment

Figure 4: Size of First Month's Payment in the Third Year Under Alternative Interest Rate Assumptions



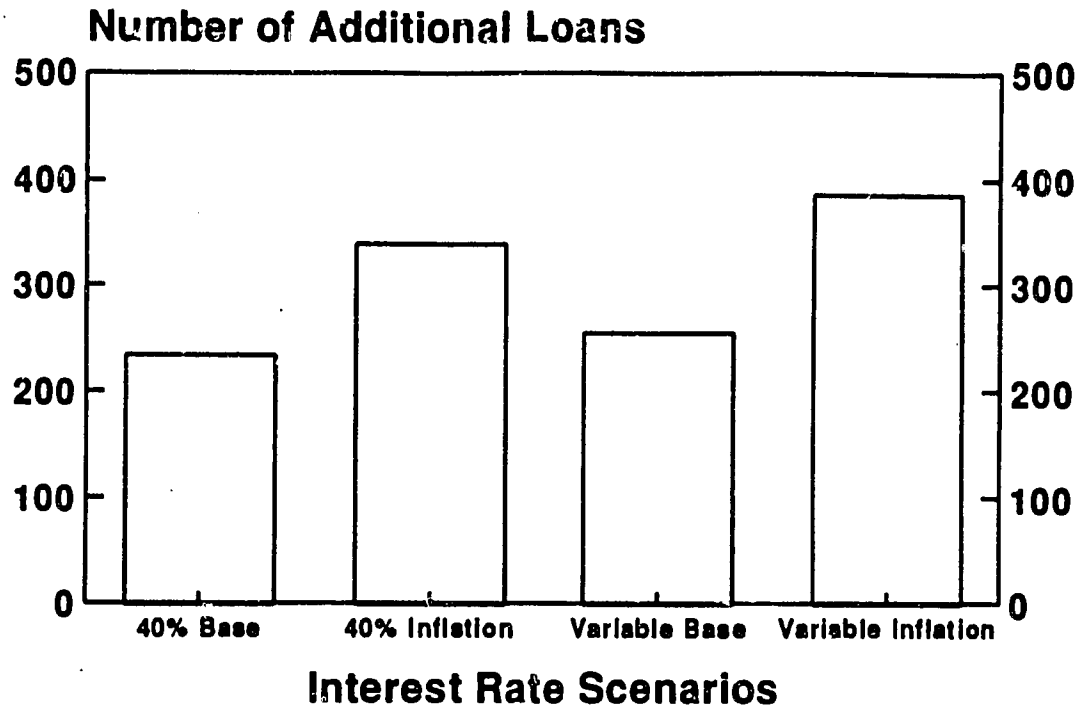
*Assumes an average loan size of Lv. 1 Million

Figure 5: Size of Required First Month of Third Year's Sales Under Alternative Interest Rate Assumptions



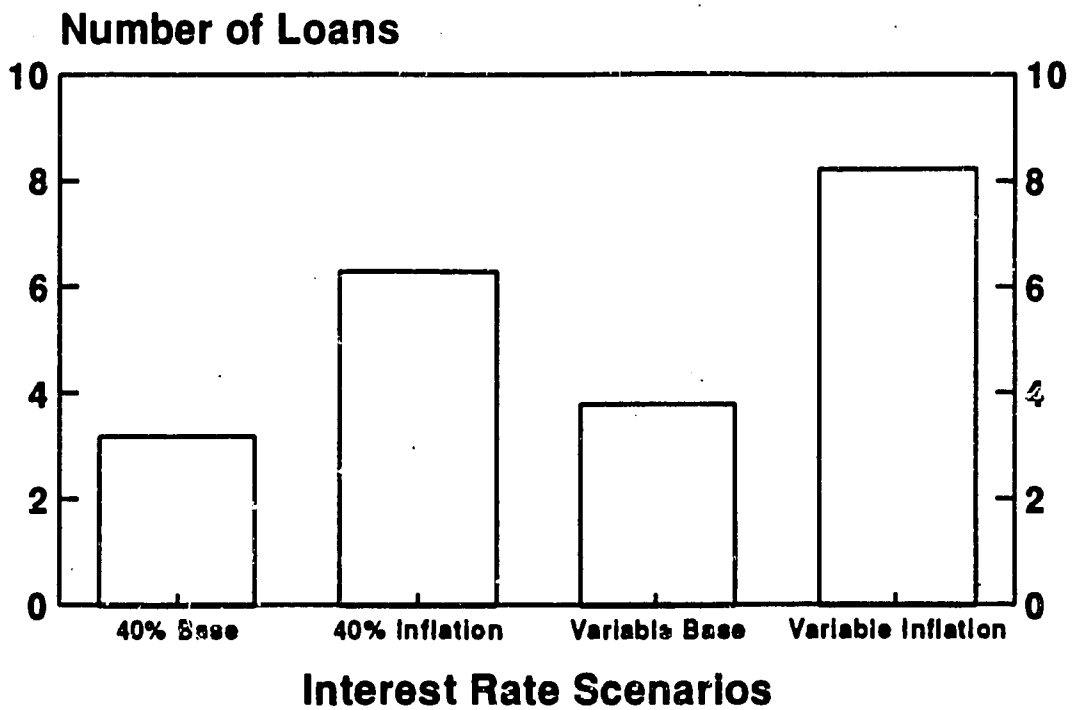
*Assumes an average loan size of Lv. 1 Million and that no more than 15% of sales is used for loan repayment

Figure 6: Additional Loans* Made With Repayments Under Alternative Interest Rate Assumptions For First 15 Years of Fund Operation



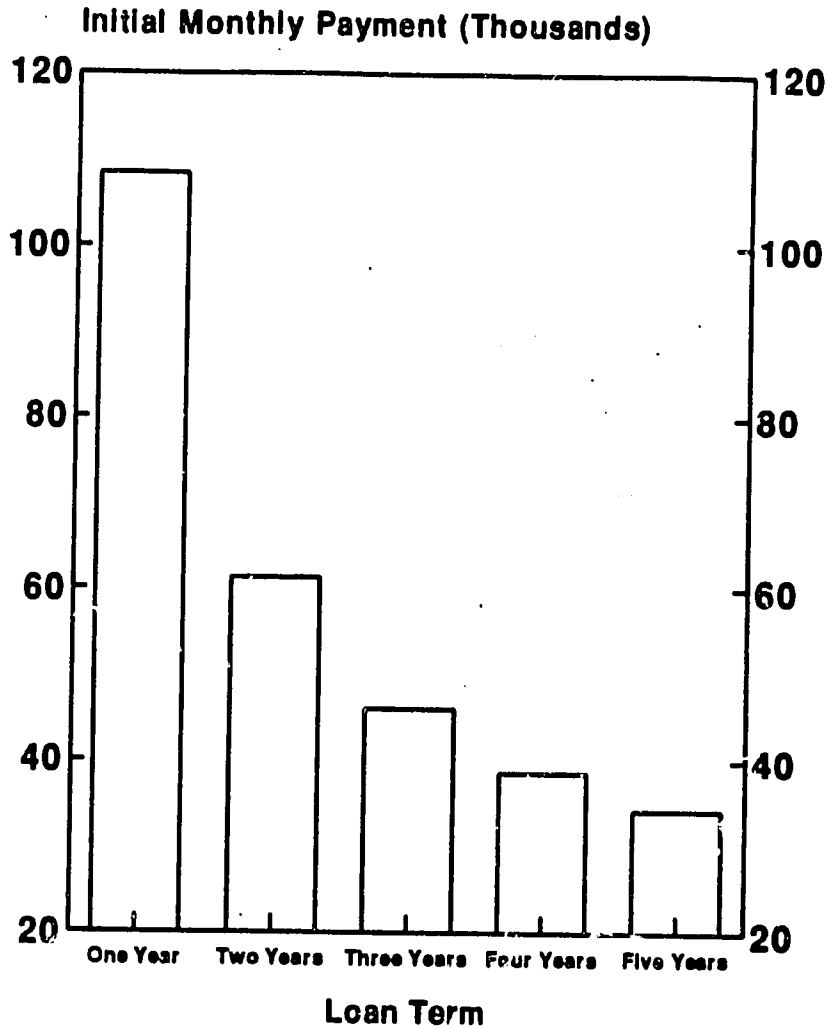
*Assumes an average real loan size of Lv. 1 Million

Figure 7: Number of Loans Made In 15th Year of Fund Operation Under Alternative Interest Rate Assumptions



*Assumes an average real loan size of Lv. 1 Million

Figure 8: First Required Monthly Payments For a Lv. 1 million loan at a 30% Interest Rate Under Alternative Assumptions about Loan Term



CONCLUSIONS

- Inflation Index Vs. BNB Base Rate Index

  - Inflation index first payment about 30% higher than base rate first payment

  - Inflation index allows the fund to make from 339 to 385 additional loans from repayments. Use of the base rate allows for only about 245 additional loans

  - Base rate can be used to approximate inflation
    Example: Interest rate = 68% of base rate yields same results as interest rate = to 40% of inflation

    But this requires fund management to guess accurately the future relationship between inflation and the base rate

  - Using the inflation rate as an index may be administratively more complex than using the base rate
    But can agree to adjust on a quarterly basis
    and use lagged inflation information

- Increasing Interest Rate Vs. Constant Interest Rate

  - An increasing interest rate loan is more affordable for borrowers and preserves the value of the fund better than a fixed rate loan.

    But its benefits are not very large when loan terms are relatively short

    Example: Affordability is increased by 5-8% and number of new loans generated is increased by 8-12%

  - An increasing interest rate loan is more difficult to explain to borrowers and to administer

- Increasing loan term greatly increases affordability

ANNEX 2:
SECOND PRESENTATION OF
ANALYSIS OF AFFORDABILITY AND
CAPITAL CONSERVATION FOR
THE STARA ZAGORA INVESTMENT FUND
February 25, 1993

Assumptions

Average loan size	Lv. 1 million
Grace period	0.5 years
Repayment period	3.0 years
Fund size	Lv. 400 million
Fund distribution over time:	
First year	10%
Second year	20%
Third year	40%
Fourth year	20%
Fifth year	10%
Fund expenses as % interest income	20%

Ratio of the Base Rate to inflation is constant over time at 59%

Amortization is Monthly

Interest Rate and Amortization Scenarios

1. 40% Inf EMI:
   - Interest is fixed at 40% of inflation
   - Payments are equal monthly installments composed of a gradually increasing principal payment and a decreasing interest payment

2. 40% Inf EP:
   - Interest is fixed at 40% of inflation
   - Payments are composed of a constant principal payment and a gradually decreasing interest payment

3. 40% Base EMI:
   - Interest is fixed at 40% of the central bank base rate
   - Payments are equal monthly installments composed of a gradually increasing principal payment and a decreasing interest payment

4. 40% Base EP:
   - Interest is fixed at 40% of the central bank base rate
   - Payments are composed of a constant principal payment and a gradually decreasing interest payment

Figure 1: Inflation Scenario

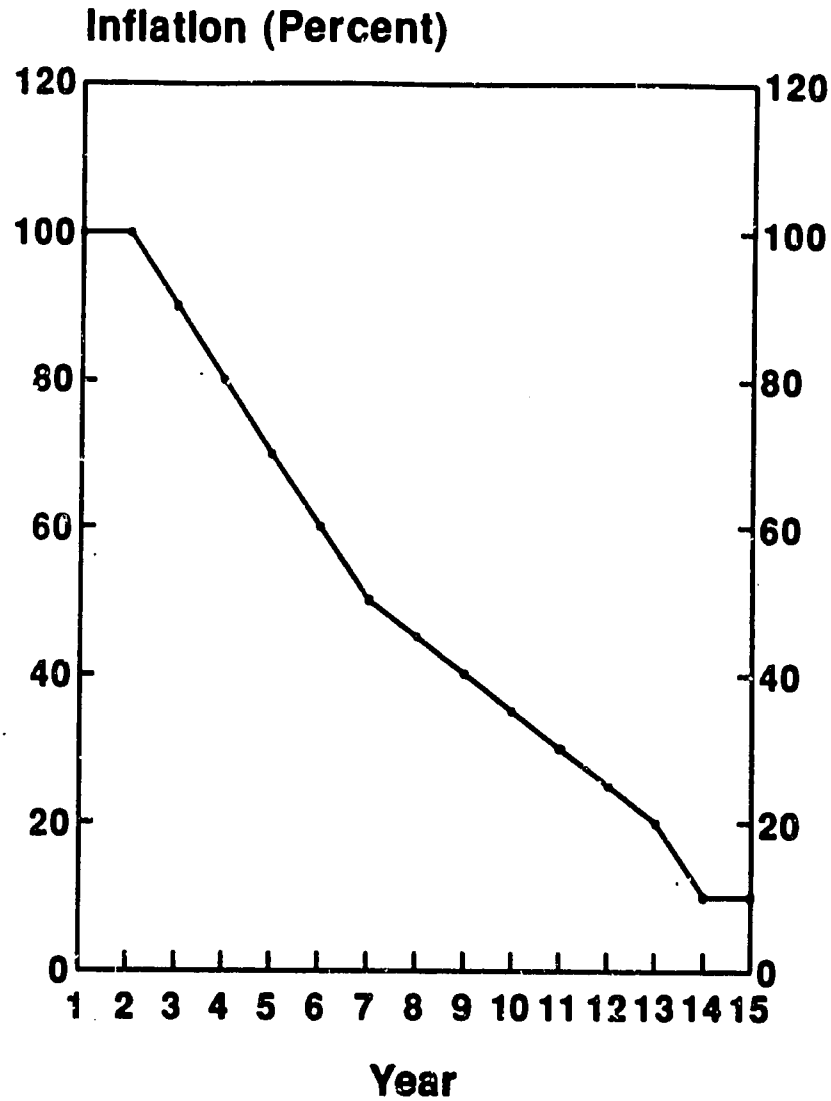
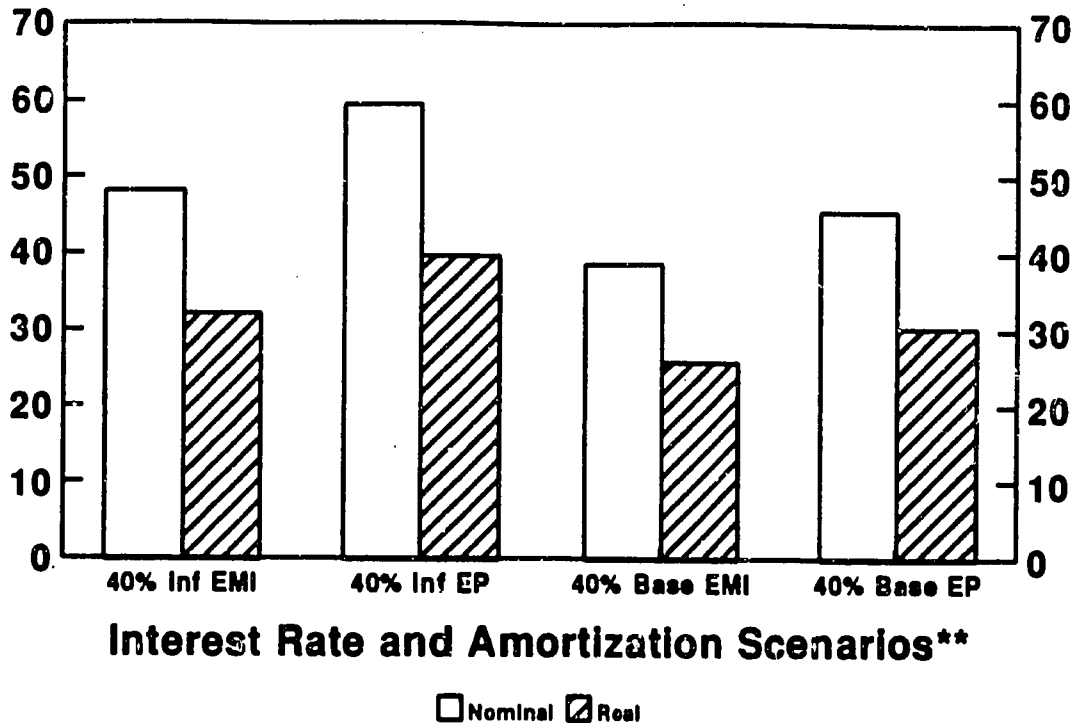


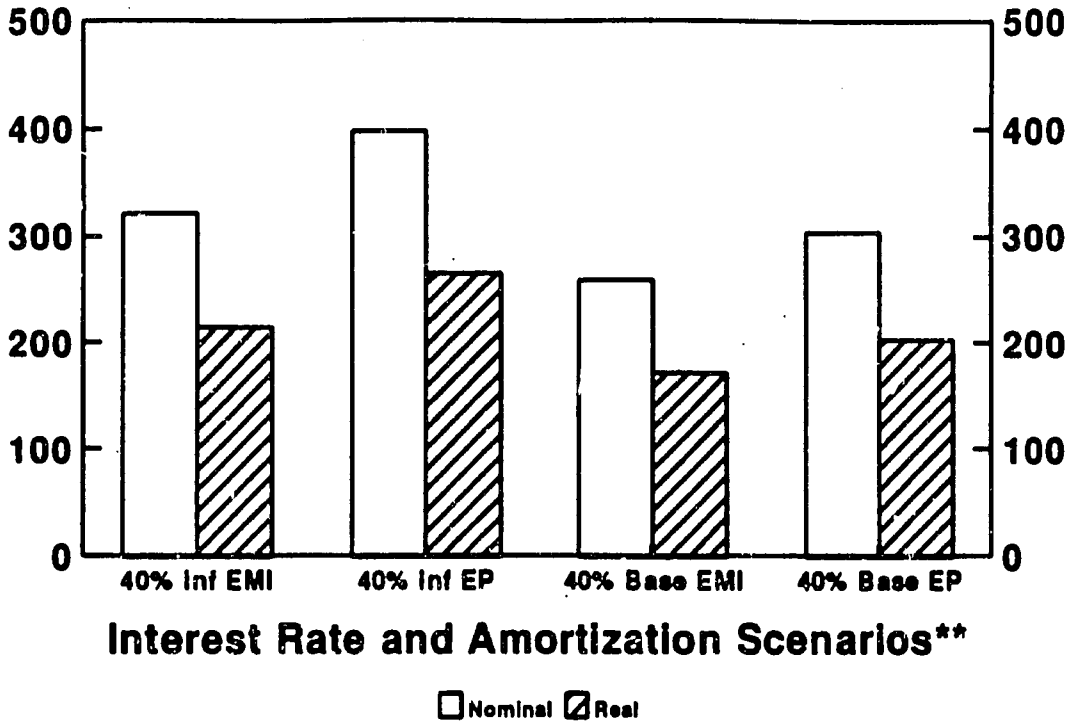
Figure 2: Size of First Month's Payment*
Under Alternative Interest Rate and Amortization Assumptions



* Assumes an average loan size of Lv. 1 Million

**40% Inf=Interest fixed at 40% of Inflation; 40% Base=Interest fixed at 40% of Base Rate
Amortization: EMI=equal monthly installments; EP=equal principal payments

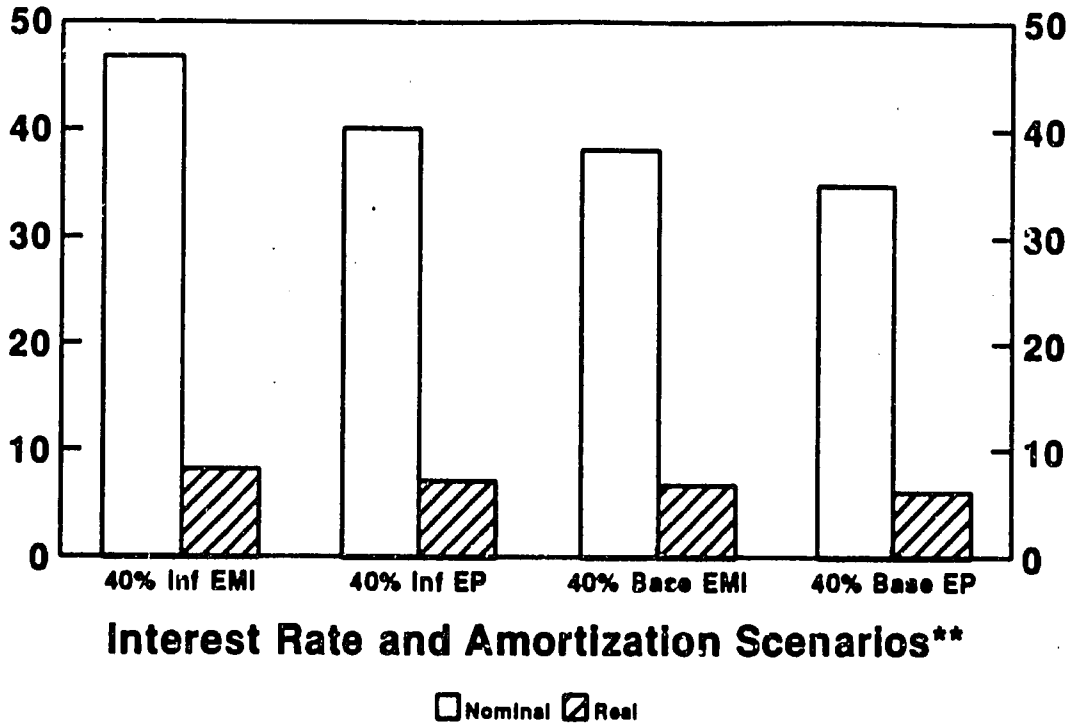
Figure 3: Size of Required First Month's Sales*
Under Alternative Interest Rate and Amortization Assumptions



* Assumes an average loan size of Lv. 1 Million

**40% Inf=Interest fixed at 40% of inflation; 40% Base=Interest fixed at 40% of Base Rate
Amortization: EMI=equal monthly installments; EP=equal principal payments

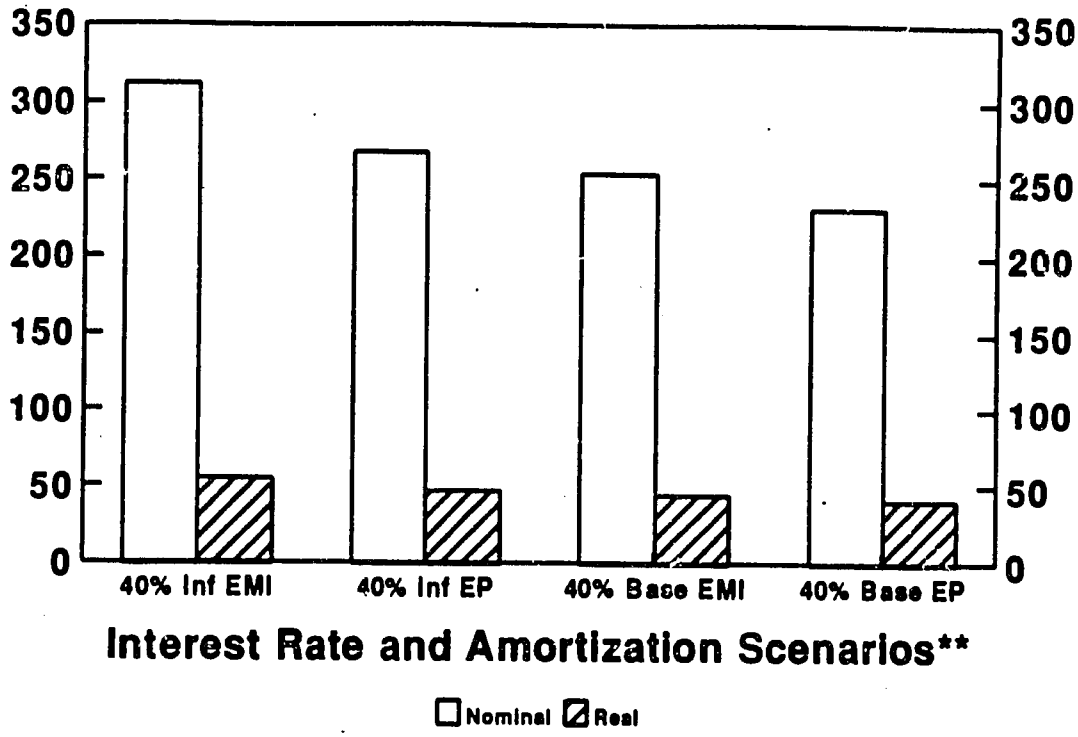
Figure 4: Size of First Month's Payment in Third Year* Under Alternative Interest Rate and Amortization Assumptions



* Assumes an average loan size of Lv. 1 Million

**40% Inf=Interest fixed at 40% of Inflation; 40% Base=Interest fixed at 40% of Base Rate
Amortization: EMI=equal monthly installments; EP=equal principal payments

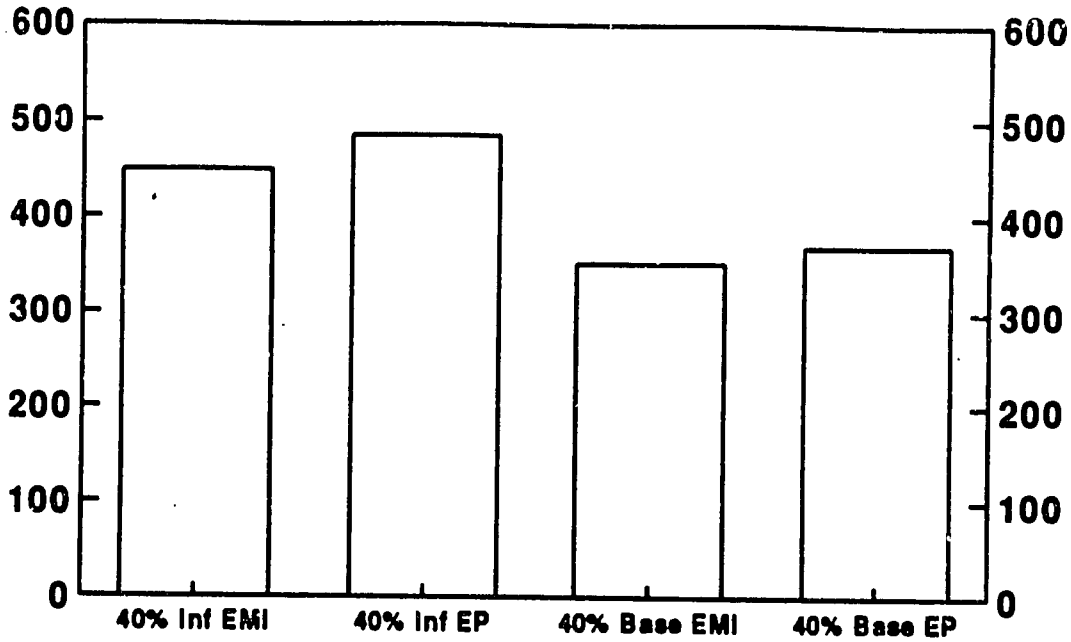
Figure 5: Size of Required First Month of Third Year's Sales* Under Alternative Interest Rate and Amortization Assumptions



* Assumes an average loan size of Lv. 1 Million

**40% Inf=Interest fixed at 40% of Inflation; 40% Base=Interest fixed at 40% of Base Rate
Amortization: EMI=equal monthly installments; EP=equal principal payments

Figure 6: Additional Loans Made with Repayments* Under Alternative Interest Rate and Amortization Assumptions

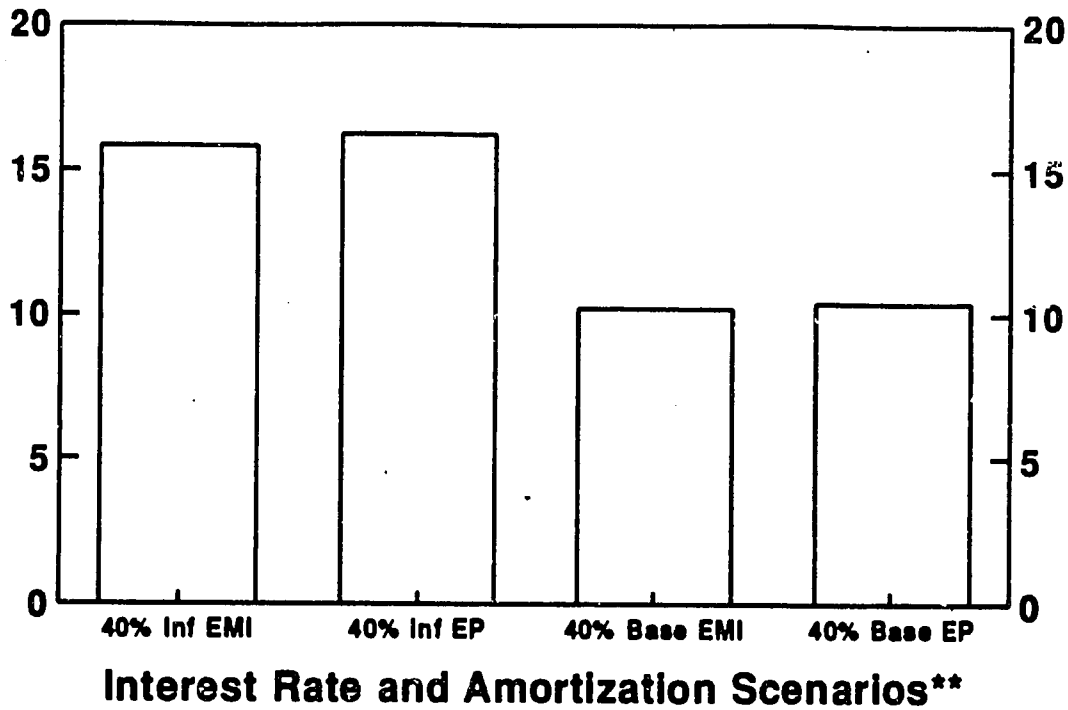


Interest Rate and Amortization Scenarios**

* Assumes an average loan size of Lv. 1 Million

**40% Inf=Interest fixed at 40% of Inflation; 40% Base=Interest fixed at 40% of Base Rate
Amortization: EMI=equal monthly installments; EP=equal principal payments

Figure 7: Number of Loans Made in 15th Year of Fund Operation*
Under Alternative Interest Rate and Amortization Assumptions



* Assumes an average loan size of Lv. 1 Million
**40% Inf=Interest fixed at 40% of inflation; 40% Base=Interest fixed at 40% of Base Rate
Amortization: EMI=equal monthly installments; EP=equal principal payments

CONCLUSIONS

- Inflation Index Vs. BNB Base Rate Index

  - When the inflation index is used, the first payment is about 25% to 30% higher than when the base rate index is used

  - Use of the inflation index allows the fund to make from 447 to 483 additional loans from repayments. Use of the base rate allows for only about 350 to 370 additional loans

  - Use of the base rate as an interest index produces a higher first payment and lower conservation of funds because we have assumed that the base rate remains equal to approximately 59% of inflation

  - Base rate can be used to approximate inflation
    Example: Interest rate = 68% of base rate yields same results as interest rate = to 40% of inflation

    But this requires fund management to guess accurately the future relationship between inflation and the base rate

  - Using the inflation rate as an index may be administratively more complex than using the base rate
    But can agree to adjust payments on a quarterly basis and use lagged inflation information

- Equal Monthly Installment Amortization Vs. Equal Principal Amortization

  - An equal monthly installment (EMI) amortization scheme provides a significant increase in affordability vs the Equal Principal system in the early months of loan repayment, when payments are highest in real terms.

    - Example: EMI payments in the first month are 17 to 24 percent more affordable for borrowers than EP payments

      In the 25th month of repayment, EP payments are slightly more affordable than EMI payments. But by this time, the real value of EMI payments has declined by 74 percent, so the borrower does not need this increased affordability.

  An EP amortization schedule conserves the real value of the fund better than an EMI schedule, but this benefit is relatively small

    - Example: Use of EP amortization allows for 5 to 8 percent more loans to be made than use of EMI amortization

ANNEX 3
GENERAL FUND PROCEDURES AND CRITERIA FOR BUSINESS PROPOSAL EVALUATION

To qualify for a loan from the investment fund, businesses must be located in Stara Zagora, and they must produce a product or service (businesses engaging exclusively in trade will not be considered). Funds should be used for investment not working capital. In addition, preference will be given to firms which do one or more of the following: create five or more new jobs; fill an unmet market need; demonstrate environmental soundness; attract foreign investment; make use of local and/or recycled supplies; and have a high turnover rate.

Applicants must furnish detailed financial data and a business plan to demonstrate to what extent the firm satisfies the above criteria and the firm's technical and financial ability to survive and repay the loan. The Fund's board of directors will certify local consultants to analyze applications. Each application will be reviewed by a technical expert and a business expert. The experts will have one month to perform their analyses and submit written reports to the Fund's board. The Board will review the reports and decide whether or not to approve the loans.

Technical experts will be drawn from local firms in appropriate fields. Business experts will be CPAs and/or will come from the consulting firms participating in the reevaluation of the city's business assets. All experts will be local businesspeople as fund management feels that they will have a good understanding of the environment, and will take the responsibility very seriously as their reputation will suffer if loans they recommend are not repaid.

To further safeguard the interests of the fund, management will require collateral of equal or greater market value than the loan to be made. Furthermore, the fund will retain ownership of the assets purchased with loan resources until the credit is repaid. In the event of default, the fund will be able to take possession of the assets without a court order. The loan contract will also enable the fund to take ownership of the firm's business plan and project design, and the soft and hard assets will be auctioned as a package.

In general, the director of the fund was confident that highly skilled technical and business consultants could be located to perform the required evaluations. He did, however, believe it would be useful for a Western business underwriting expert to teach a short course in underwriting to the business consultants approved by the Board.