

ECONOMICS 26
FINANCIAL INTERMEDIARIES & MARKETS
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PROBLEM SET #2 - SOLUTIONS

1. (a) $LV = \$212,000$; $i = 7.125\%/12$; $n = 360$ months

(i) monthly payment (Note, discount points are not relevant to calculating payments)

$$FP = LV \div \left[\frac{1}{i} \left(1 - \frac{1}{(1+i)^N} \right) \right] = \$212,000 \div \left[\frac{1}{7.125\%/12} \left(1 - \frac{1}{(1+7.125\%/12)^{360}} \right) \right] = \$1,428.28$$

(ii) principal paid = $\$212,000$ - principal remaining

$$remaining = \$1,428.28 \times \left[\frac{1}{7.125\%/12} \left(1 - \frac{1}{(1+7.125\%/12)^{336}} \right) \right] = \$207,640.42$$

\Rightarrow principal paid = $\$4,359.58$

(iii) interest paid = (24 months)($\$1,428.28$ per month) - $\$4,359.58 = \$29,919.14$

(b) Whether or not to refinance depends on the present value of the savings from refinancing compared with the cost of refinancing

monthly payment if refinance:

$$FP = LV \div \left[\frac{1}{i} \left(1 - \frac{1}{(1+i)^N} \right) \right] = \$207,640.42 \div \left[\frac{1}{6.5\%/12} \left(1 - \frac{1}{(1+6.5\%/12)^{336}} \right) \right] = \$1,343.47$$

present value of monthly savings at the new interest rate:

$$PV = FP \times \left[\frac{1}{i} \left(1 - \frac{1}{(1+i)^N} \right) \right] = 84.81 \times \left[\frac{1}{6.5\%/12} \left(1 - \frac{1}{(1+6.5\%/12)^{336}} \right) \right] = \$13,108.34$$

Clearly, you save more than $\$2,000$ by refinancing. If you hold the mortgage for 28 years, you will be willing to pay up to $\$13,108.34$ to refinance.

present value of monthly savings at the new interest rate if you keep house for two years:

$$PV = FP \times \left[\frac{1}{i} \left(1 - \frac{1}{(1+i)^N} \right) \right] = 84.81 \times \left[\frac{1}{6.5\%/12} \left(1 - \frac{1}{(1+6.5\%/12)^{24}} \right) \right] = \$1,903.86$$

This is less than the cost of the loan, so I won't refinance. I would be willing to pay up to \$1,903.86 today to refinance.

(Note, this answer ignores taxes, inflation, and changes in housing prices.)

2.

$$(1 + i_{us}) = E_t / E_{t+6mo.} \times (1 + i_{jp})$$

$$E_{t+6mo.}^e = 108 \text{yen/dollar} \times (1 + 0.03/2) / (1 + 0.0599/2) = 108 \times 1.015 / 1.02995 = 106.43 \text{yen/dollar}$$

3. In the long run, the increase in demand for French exports leads to an appreciation of the franc. However, lower tariffs on imports from the U.S. leads to a depreciation of the franc in the long run. Therefore, the effect on the exchange rate is uncertain.
4. A drop of expected inflation in Mexico and subsequent drop in nominal interest rates leads to higher real interest rates. This is because nominal rates typically fall more slowly than inflation. (See footnote 5 on p330 of M&E and associated text.) The resulting rise in expected returns on peso denominated deposits shifts the $RET^{\text{Mex.}}$ curve out to the right. This leads to a fall in the equilibrium peso/\$ exchange rate. Hence, the peso will appreciate.

5. (a)

Assets		Liabilities	
reserves	\$0	checkable deposits	\$1.5 M
home mortgage loans	\$4.0 M	NOW accounts	\$2.0 M
commercial loans	\$3.0 M	savings deposits	\$2.5 M
U.S. T-bonds	\$2.5 M	time deposits	\$3.0 M
Physical capital	\$1.0 M	capital	\$1.5 M
Total Assets	\$10.5 M	Total Liabilities	\$10.5 M

- (b) If the bank is required to hold 10% of its checkable deposits in reserves, then it must hold at least \$150,000 in reserves. NOW accounts are also transaction deposits that are subject to reserve requirements, so Bob's Bank should have at least \$350,000 in reserves. (Currently, there are no reserve requirements on savings and personal time deposits.)

(c) Balance sheet after adjusting bond holdings:

Assets		Liabilities	
reserves	\$0.35 M	checkable deposits	\$1.5 M
home mortgage loans	\$4.0 M	NOW accounts	\$2.0 M
commercial loans	\$3.0 M	savings deposits	\$2.5 M
U.S. T-bonds	\$2.15 M	time deposits	\$3.0 M
Physical capital	\$1.0 M	capital	\$1.5 M
Total Assets	\$10.5 M	Total Liabilities	\$10.5 M

(d) There are many ways that the bank can adjust its liabilities. It can attract more deposits, issue more CDs, borrow from other banks or from the Fed, or raise capital by issuing new equity shares. If it borrows reserves in the Fed funds market, its balance sheet would look as follows:

Assets		Liabilities	
reserves	\$0.35 M	checkable deposits	\$1.5 M
home mortgage loans	\$4.0 M	NOW accounts	\$2.0 M
commercial loans	\$3.0 M	savings deposits	\$2.5 M
U.S. T-bonds	\$2.5 M	time deposits	\$3.0 M
Physical capital	\$1.0 M	borrowings	\$0.35 M
		capital	\$1.5 M
Total Assets	\$10.85 M	Total Liabilities	\$10.85 M

(e) Over the next year, Bob's Bank will earn 7.0% on its home mortgage loans, 9.0% on its commercial loans, and 6.0% on its bond holdings. It will pay out an average of 6.1% on its CDs, 4.0% on its savings accounts, and 2.7% on its NOW accounts. What will the bank's net interest margin be for the coming year?

$$\text{NIM} = (\text{interest income} - \text{interest expenses}) / \text{assets}$$

$$= \frac{(0.07)(4.0) + (0.09)(3.0) + (0.06)(2.5) - (0.061)(3.0) - (0.04)(2.5) - (0.027)(2.0)}{10.5}$$

$$= 3\%$$