



對外經濟貿易大學

# Chapter 12

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## Customer Profitability Analysis and Loan Pricing

# Customer profitability analysis

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- The analysis procedure compels banks to be aware of the full range of services purchased by each customer and to generate meaningful cost estimates for providing each service.
  - The applicability of customer profitability analysis has been questioned in recent years with the move toward unbundling services.
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# Account analysis framework

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- Customer profitability analysis is used to evaluate whether net revenue from an account meets a bank's profit objectives.

$$\text{Account Revenue} \geq \text{Account Expenses} + \text{Target Profit}$$

# Identify the full list of services used by a customer

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- Transactions account activity
- Extension of credit
- Security safekeeping, and
- Related items such as:
  - Wire transfers
  - Safety deposit boxes
  - Letters of credit
  - Trust accounts

# Expense components

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- Noncredit services
- Credit Services
  - Cost of funds
  - Loan administration
  - Default risk expense

# Non-credit services

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- Aggregate cost estimates for noncredit services are obtained by multiplying the unit cost of each service by the corresponding activity level.
- Example:
  - it costs \$7 to facilitate a wire transfer and the customer authorizes eight such transfers, the total periodic wire transfer expense to the bank is \$16 for that account.
- These costs include the interest cost of financing the loan, loan administration costs, and risk expense associated with potential default.

# Credit services

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- Cost of Funds  
*...the cost of funds estimate may be a bank's weighted marginal cost of pooled debt or its weighted marginal cost of capital at the time the loan was made.*
- Loan Administration  
*...loan administration expense is the cost of a loan's credit analysis and execution.*
- Default Risk Expense  
*...the actual risk expense measure equals the historical default percentage for loans in that risk class times the outstanding loan balance.*

# Commercial loan classification by risk category

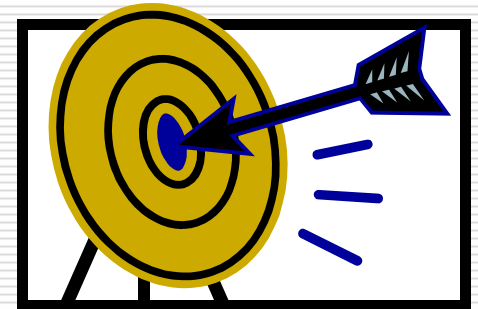
<b>Risk Class</b>	<b>Characteristics</b>	<b>Historical Default Percentage</b>
1	Short-term working capital loans secured with accounts receivable and inventory	0.22%
2	Short-term real estate loans secured by facility and borrower's cash flow from total operations	0.61
3	Term plant and equipment loans secured by physical plant and other real estate	1.3
4	Other loans	1.94



# Target profit

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- The target profit is then based on a minimum required return to shareholders per account.



$$\text{Target profit} = \left( \frac{\text{Equity}}{\text{Total assets}} \right) \left( \text{Target return to shareholders} \right) (\text{Loan amount})$$

# Revenue components

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- Banks generate three types of revenue from customer accounts:
  1. investment income from the customer's deposit balance held at the bank
  2. fee income from services
  3. interest income on loans



# Estimating investment income from deposit balances

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1. A bank determines the average ledger (book) balances in the account during the reporting period.
2. The average transactions float is subtracted from the ledger amount.
3. The bank deducts required reserves to arrive at investable balances.
4. Management applies an earnings credit rate against investable balances to determine the average interest revenue earned on the customer's account.

# Calculation of investment income from demand deposit balances

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- Analysis of Demand Deposits:  
Corporation's Outstanding Balances for November
  - Average ledger balances = \$335,000
  - Average float = \$92,500
  - Collected balance  $\$335,000 - \$92,500 = \$242,500$
  - Required reserves (0.10)  $\$242,500 = \$24,250$
  - Investable balance  $\$218,250$
- Earnings Credit Rate:
  - Average 90-day CD rate for November = 4.21%
- Investment Income from Balances: November
  - Investment Income  
 $= 0.0421 (30/365) (\$218,250) = \$755.20$

# Compensating balances

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- In many commercial credit relationships, borrowers must maintain compensating deposit balances with the bank as part of the loan agreement.
  - Ledger balances are those listed on the bank's books
  - Collected balances equal ledger balances minus float associated with the account
  - Investable balances are collected balances minus required reserves

# Fee income

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- When a bank analyzes a customer's account relationship, fee income from all services rendered is included in total revenue.
- Fees are frequently charged on a per-item basis, as with Federal Reserve wire transfers, or as a fixed periodic charge for a bundle of services, regardless of rate of use.

# Fee income (continued)

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- Facility fee  
*...the fee applies regardless of actual borrowings because it is a charge for making funds available.*
  - The most common fee selected is a facility fee, which ranges from 1/8 of 1 percent to 1/2 of 1 percent of the total credit available
- Commitment fee  
*...serves the same purpose as a facility fee but is imposed against the unused portion of the line and represents a penalty charge for not borrowing*
- Conversion fee  
*...a fee applied to loan commitments that convert to a term loan after a specified period*
  - Equals as much as 1/2 of 1 percent of the loan principal converted to term loan and is paid at the time of conversion

# Loan interest and base lending rates

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- Loans are the dominant asset in bank portfolios, and loan interest is the primary revenue source
- The actual interest earned depends on the contractual loan rate and the outstanding principal.



# Loan rates

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- Most banks price commercial loans off of base rates, which serve as indexes of a bank's cost of funds.
- Common base rate alternatives include the federal funds rate, CD rate, commercial paper rate, the London Interbank Offer Rate (LIBOR), the LIBOR swap curve, Wall Street prime, and a bank's own weighted cost of funds.

# Loan rates

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- The contractual loan rate is set at some mark-up over the base rate, so that interest income varies directly with movements in the level of borrowing costs.
  - The magnitude of the mark-up reflects differences in perceived default and liquidity risk associated with the borrower.
- Floating-rate loans are popular at banks because they increase the rate sensitivity of loans in line with the increased rate sensitivity of bank liabilities.

# Fixed rates

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- In each case, the contractual rates should reflect the estimated cost of bank funds, perceived default risk, and a term liquidity and interest rate risk premium over the life of the agreement.

# Customer profitability analysis for Banken industries

## Banken Industries

### Customer Profitability Analysis

#### Loan agreement

Line of credit	5,000,000
Conversion period (years)	3
Bank's base rate	8.00%
% over base rate	2.00%
Contractual interest rate	10.00%

#### Fees:

Facility fee	0.125%
Conversion fee	0.250%

#### Compensating balances

% of facility	3.00%
\$ bal req for facility	150,000
% of actual borrowing	2.00%
\$ bal req for borrowing	82,000
Total Comp Bal Req.	232,000

## Banken Industries

### Customer Profitability Analysis

#### Loan and Deposit Activity:

Number of days in period	90
Average Borrowings	4,100,000
Loan admin. (annual)	0.70%
Risk expense (annual)	1.00%
Average ledger demand dep. balance	174,516
Average float	60,112
Required reserve ratio	10.00%
Earnings credit rate	5.10%
Weigh. Avg. cost of debt	7.04%
Percent of financing in debt	92.00%
Weigh. marg. cost of debt	6.48%
Bank tax rate	35.00%

# Customer profitability analysis for Banken industries, expense estimates

## Customer Profitability Analysis

Expenses	# items	\$ per unit	Cost	Total
<i>Demand Deposit Expense</i>				
Home debits	4,187	0.23	963.01	
Transit items	15,906	0.12	1,908.72	
Deposits	90	0.35	31.50	
Returned items	33	3.50	115.50	
Account maintenance	3	6.75	20.25	
<i>Total transaction exp.</i>				3,038.98
<i>Wire transfers</i>	336	2.00		672.00
<i>Security safekeeping</i>	13	4.00		52.00
<i>Payroll processing</i>	3	1,500		4,500.00
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		<b>Days in</b>		<b>Total</b>
<i>Loan expense:</i>	<b>Rate</b>	<b>Period</b>	<b>Amount</b>	<b>Expense</b>
Loan administration	0.70%	90	4,100,000	7,076.71
Risk expense	1.00%	90	4,100,000	10,109.59
Interest expense	6.48%	90	4,100,000	65,477.79
<i>Total Expenses</i>				<b>\$90,927.07</b>

# Customer Profitability Analysis for Banken Industries, Revenue and Target Profits Estimates

## Customer Profitability Analysis

Revenues	Rate	Days in Period	Amount	
<i>Investment income from:</i>				
Ledger balances			174,516	
Minus float			60,112	
Collected balance			114,404	
Minus required reserves @ 10.00%			11,440	
<b>Investable balances</b>			<b>102,964</b>	
Investment income	5.10%	90	102,964	1,294.80
Fee income	0.13%	90	5,000,000	1,541.10
Loan interest	0	90	4,100,000	101,095.89
<b>Total Revenue</b>				<b>\$103,931.79</b>
Target Profit	Rate	Days in Period	Amount	Total
Target pretax return	18.00%			
Relevant fin. % of equity	8.00%			
<b>Target profit</b>	18.00%	90	4,100,000	14,557.81
Total Profit Req. (Expenses + Target Profit)				105,484.88
<b>Revenue - Expenses + Target Profit</b>				<b>(\$1,553.09)</b>

# Pricing new commercial loans

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- The approach is the same, equating revenues with expenses plus target profit, but now the loan officer must forecast borrower behavior.
- For loan commitments this involves projecting the magnitude and timing of actual borrowings, compensating balances held, and the volume of services consumed.

# Loan pricing analysis

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Option A: requires 4+4 investable balance or \$490,000 net of account float and req. res.

Option B: assumes no compensating balances but pays a 0.025 facility fee.



# Loan pricing analysis

## *Expenses*

Deposit activity	\$ 68,000	
Loan administration and risk	68,250	(0.013 x \$5.25 million)
Interest on borrowed funds	388,500	(0.074 x \$5.25 million)
	<u>\$524,750</u>	
<b>Target Profit</b>	66,150	(0.18 x 0.07 x \$5.25 million)
Total	<u>\$590,900</u>	
Revenues		

**Option A:** Compensating balances set at 4 + 4 investable balances (\$490,000); earnings credit rate = 4%; 1/2 of 1% commitment fee

**Option B:** 1/4 of 1% facility fee, no balances required

	<b>Option A</b>	<b>Option B</b>
Fee income	\$ 8,750	\$ 17,500
Investment income from balances	19,600	0
Required loan interest	562,550	573,400
Total	\$590,900	\$590,900
Required loan rate	10.72%	10.92%

NOTE: Required loan rate is  $\$562,550 / 5,250,000 = 10.72$  percent;  
 $573,400 / 5,250,000 = 10.92$  percent.



# Risk-adjusted returns on loans

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- When deciding what rate to charge, loan officers attempt to forecast default losses over the life of the loan.
  - Credit risk, in turn, can be divided into expected losses and unexpected losses.
    - Expected losses might be reasonably based on mean historical loss rates.
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# Commercial loans are frequently under-priced at banks today

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- ❑ Strong competition for loans tends to increase the banks under-pricing of loans.
- ❑ Lenders appear to have systematically understated risk.
- ❑ The appropriate procedure is to identify expected and unexpected losses and incorporate both in determining the appropriate risk charge.

# Fixed rates versus floating rates

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- Floating-rate loans:
  - increase the rate sensitivity of bank assets
  - increase the GAP
  - reduce potential net interest losses from rising interest rates
- Because most banks operate with negative funding GAPs through one-year maturities, floating-rate loans normally reduce a bank's interest rate risk.

# Floating-rate loans

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- Given equivalent rates, most borrowers prefer fixed-rate loans in which the bank assumes all interest rate risk.
- Banks frequently offer two types of inducements to encourage floating-rate pricing:
  1. Floating rates are initially set below fixed rates for borrowers with a choice
  2. A bank may establish an interest rate cap on floating-rate loans to limit the possible increase in periodic payments

# Base rate alternatives

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- ❑ The CD base rate is normally the quoted nominal rate adjusted for required reserves and the cost of FDIC insurance.
- ❑ LIBOR represents the quoted rate, because neither reserves nor insurance is required.
- ❑ Smaller corporations do not possess the same financial flexibility and thus do not receive the same treatment.
- ❑ Banks are moving toward using their weighted marginal cost of debt as the preferred base rate for these customers.

# Pricing alternatives over various base rates

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## 6-Year Revolver/Term Loan Pricing Options

		CD	LIBOR	Weighted Cost of Debt
Revolver	1–2	1	7/8	1/4
Term	3–4	1 1/8	1	1/2
Term	5–6	1 3/8	1 1/4	3/4

# Weighted cost of funds and base rate

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- Base rate calculation assumes:
  1. core deposits are not available to fund loans.
  2. deposits paying below market rates will continue to decrease as a funding source
- The cost of debt calculation excludes core deposits



# Sample base rate calculation

<i>Loanable Market Rate Debt</i>	<b>Amount</b>	<b>%</b>	<b>Current Rates %</b>	<b>Weighted Cost %</b>
Money market deposit accounts	\$16.8	19	4.50	0.86
Small time deposits (6-mo.)	19.5	22	5.00	1.10
Small time deposits (30-mo.)	21.3	24	6.80	1.63
Jumbo CDs	25.6	29	6.60	1.91
Federal funds purchased	5.3	6	5.15	0.31
<b>Total</b>	<b>\$88.5</b>	<b>100%</b>		<b>5.81%</b>
<b><i>Base Rate Calculation:</i></b>				
Weighted cost of market rate debt	5.81%			
Target net interest margin	4.50			
Target loan rate	10.31%			
Maximum premium over base rate	-2.50			
Base rate	7.81%			

# Customer profitability analysis: consumer installment loans

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- Two significant differences alter the analysis when evaluating the profitability of individual accounts:
  1. Consumer loans are much smaller than commercial loans, on average
  2. processing costs per dollar of loan are much higher than for commercial loans

# Customer profitability analysis: consumer installment loans

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- ❑ Loans will not generate enough interest to cover costs if they are too small or the maturity is too short, even with high interest rates.
- ❑ Thus, banks set minimum targets for loan size, maturity, and interest rates.

# Break-even analysis of consumer loans

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- The break-even relationship is based on the objective that loan interest revenues net of funding costs and losses equal loan costs:
  - Net Interest income  
= Interest expense + Loan losses  
+ Acquisition costs + Collection costs

# Break-even analysis of consumer loans general analysis

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## □ If:

$r$  = annual percentage loan rate (%)

$d$  = interest cost of debt (%)

$l$  = average loan loss rate (%)

$s$  = initial loan size

$b$  = avg. loan balance outstanding  
(% of initial loan)

$m$  = number of monthly payments

$c_a$  = loan acquisition cost, and

$c_c$  = collection cost per payment

## □ Then:

$$(r - d - l)SB(M/12) = C_a + (C_c)(M)$$

# Break-even analysis: Consumer loans

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- A 2-year loan with 24 monthly payments priced at a 12% APR, required a minimum \$6,932 initial loan to cover costs.
- A similar \$4,000 loan over two years requires a 17.95 percent APR for the bank to break even.

# Break-even analysis: Consumer loans

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## □ Average Costs: 1999 Functional Cost Analysis Data

- Acquisition cost per loan  $C_a = \$137.49$
- Collection cost per payment  $C_c = \$20.07$
- Interest cost of debt  $d = 3.31\%$
- Loan loss rate (3-year average)  $l = 0.57\%$

## □ Break-Even Loan Size (S)

### ■ Assume:

- No. of monthly payments  $m = 24$
- Annual percentage loan rate  $r = 12\%$
- Avg loan bal. outstanding (%)  $b = 55\%$

$$(0.12 - 0.0331 - 0.0057)S(0.55)(24/12) = \$137.49 + \$20.07(24)$$

$$S = \$6,932$$

# Break-even analysis: Consumer loans

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## □ Break-Even Loan Rate (r)

### ■ Assume:

■  $M = 24$

■  $S = \$3,000$

■  $B = 55\%$

$$(r - 0.0331 - 0.0057)(\$4,000)(0.55)^2 = \\ \$137.49 + 20.07(24)$$

$$r = 17.64\%$$





**Thank You Very Much for  
Your Kind Attention!**



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