

Lecture 4: Credit risk

The nature of banking is strongly related to the management and control of risks. This lecture gives an overview of the main risks to which banks are subject, namely interest rate risk/market risk, liquidity risk and credit risk, as well as broader systemic risks. We then examine economic issues relating to the core of banks' traditional business, namely on-balance-sheet lending. We focus in particular on the various ways in which banks seek to control the risks arising from their loan books. This discussion includes a brief assessment of issue of credit rationing which is an issue of both microeconomic and macroeconomic significance.

Bank risks – an overview

What is risk? – danger that a certain unpredictable contingency can occur, which generates randomness in cashflow

Risk and uncertainty – risks may be described using probability analysis (business cycle, company failures), while events subject to uncertainty cannot (financial crises, wars etc.)

Risk and variability – variability alone may not entail risk as long as known for sure ex ante

The nature of qualitative asset transformation- gives rise to risks because of mismatched balance sheet.

Main forms of risk

Credit risk – risk that party to contract fails to fully discharge terms of contract

Interest rate risk – risk deriving from variation of market prices owing to interest rate change

Market risk – more general term for risk of market price shifts

Liquidity risk – risk asset owner unable to recover full value of asset when sold (or for borrower, credit not rolled over)

Market liquidity risk – risk that a traded asset market may vary in liquidity of the claims traded

Other risks

- operational risk

- risk of fraud

- reputation risk

Systemic risk – that the financial system may undergo contagious failure following other forms of shock/risk

Introducing credit risk and the debt contract

Uncertain probability of default, given cost of bankruptcy, asymmetric information and incomplete contracts

And hence the importance of monitoring (moral hazard) and screening (adverse selection)

Need for analysis of financial statements, financial and operating information

Reputation, net worth, control and commitment (Lecture 2) as devices to reduce problems

Diversification of credit risk by holding portfolio of loans with uncorrelated prospects

Pricing and credit rationing

Credit risk transfer – securitisation and credit derivatives coming to fore (Lecture 9)

The nature of lending

Loans and investments are both forms of debt finance – fixed return, sanctions for default

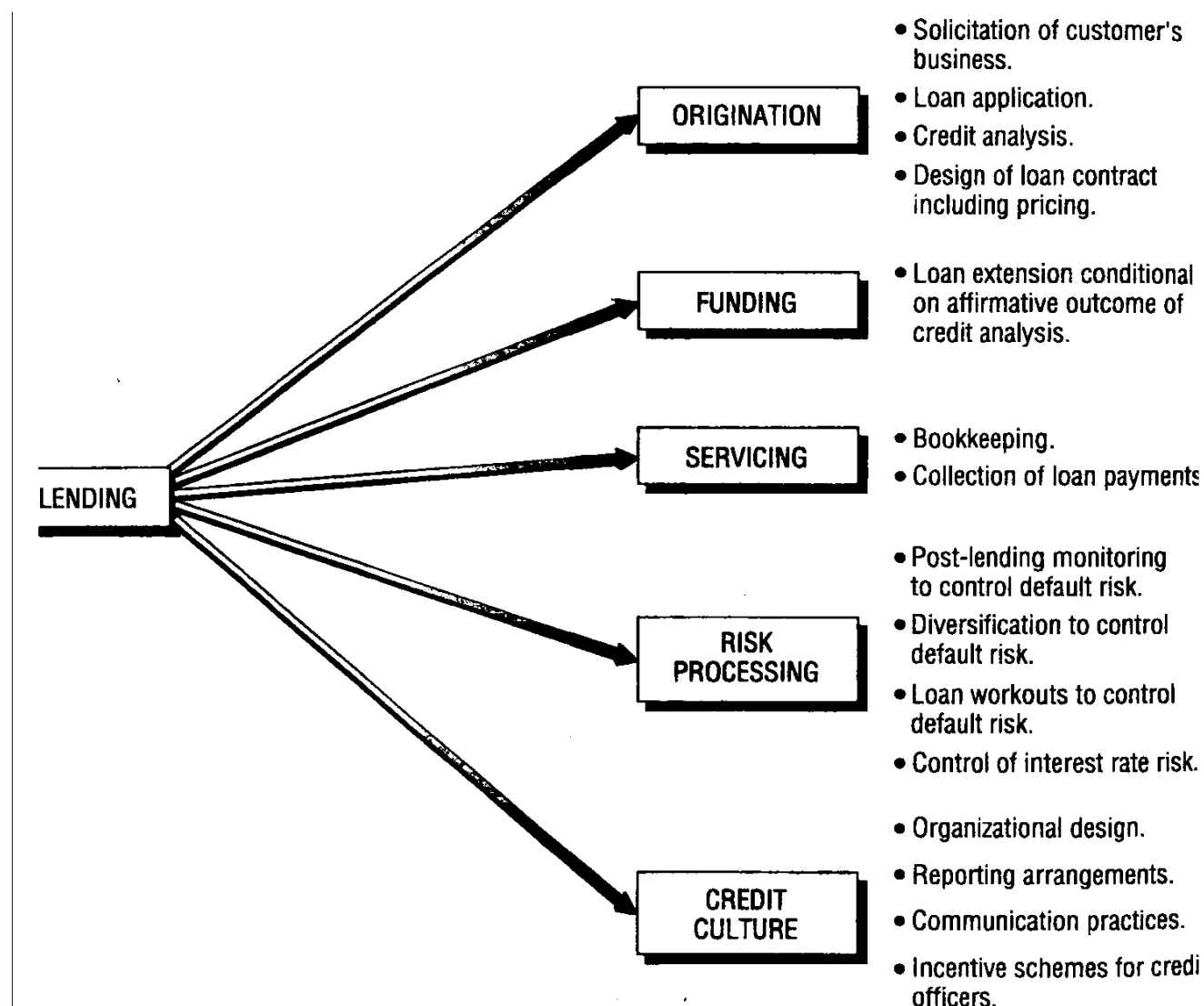
Bank loan types

- working capital,
- transactions,
- term loans,
- combinations,
- consumer loans,
- mortgages

Bank securities types

- bankers acceptances
- CP
- Government bonds
- securitised loans

Decomposition of the lending function



Decomposition/unbundling - origination, funding, servicing, risk processing, role of credit culture.

Concept of syndication

Link to securitisation (Lecture 9)

Structure of loan agreements

Traditionally informal agreements to provide short term working capital

Growing complexity – risks of longer maturity and cycle

Components include:

- principle
- maturity
- pricing
- conditions precedent
- warranties
- covenants
- events of default

Information problems - screening and monitoring

Importance of diversification

Why banks may not diversify:

- opportunity (constrained by geography to lend locally)
- sequential arrival (costly to forgo profitable opportunity due to diversification concerns)
- regulation (e.g. to lend a proportion locally)
- benefits of specialisation (expertise in local area/industry)

Lack of diversification: The Texas banking crisis

400 Texan banks failed over 1985-9

Linked to real estate lending, dependent on the energy business

- banks were concentrated in such fields, and had low capital ratios

Weakening and eventual fall of oil prices prompting regional

recession - but nation as a whole

benefited (“asymmetric shock” so Fed could not cut interest rates)

Widespread bank failures, unwillingness of interbank market to finance

Effect on local credit supply mitigated by CP, securities issue and

cross-state lending

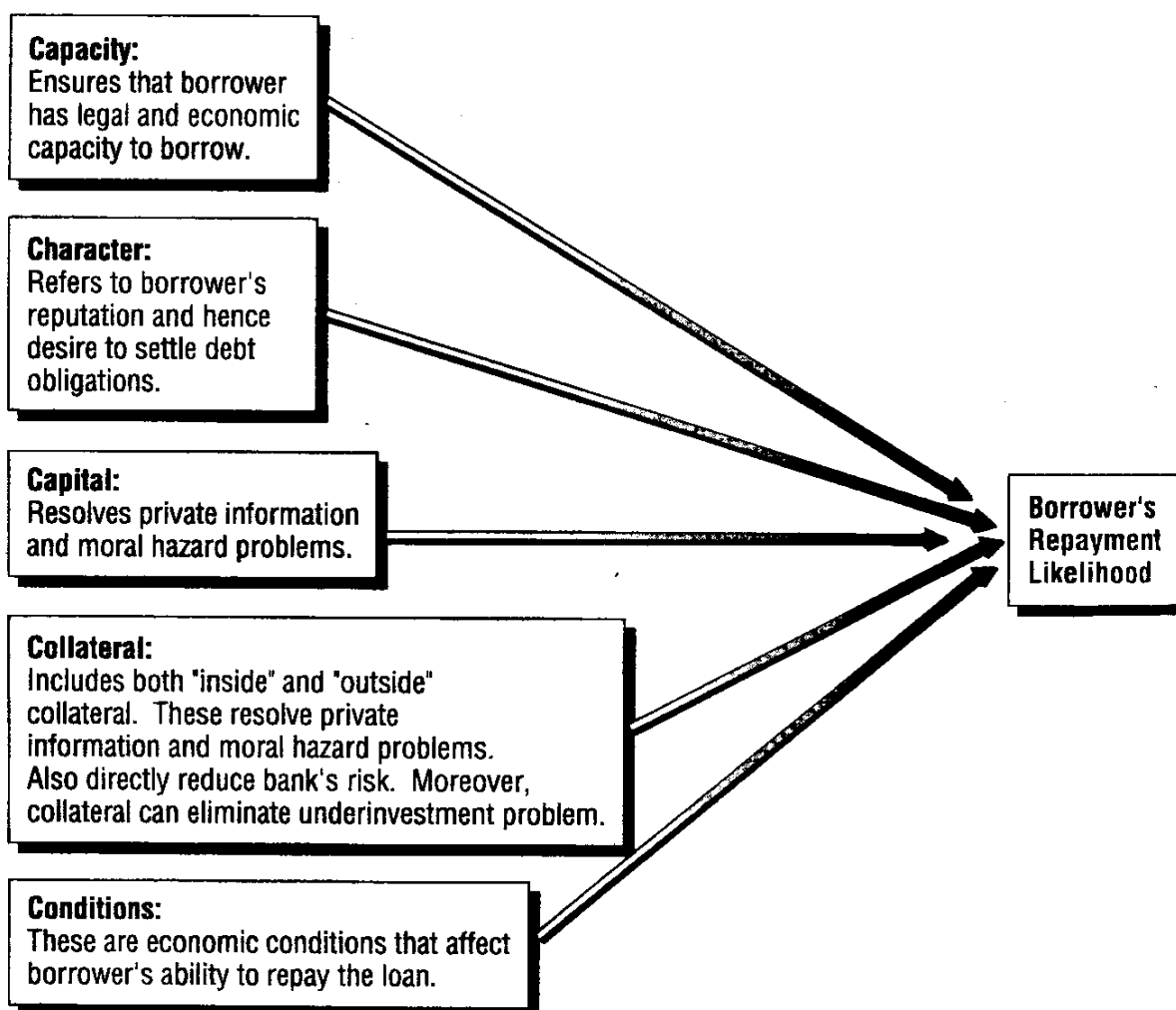
Lessons for EMU

Credit analysis and credit information (screening)

Analysis seeks to assess ability and willingness of borrower to repay.

Underlying issue – bank owns asset while borrower buys call option

Factors in credit analysis:



Capacity - legal and economic capacity to borrow

Character – desire to repay judged by reputation, history of debt repayment

Capital - resolves agency problems arising from asymmetric information (more equity, less moral hazard - as call option is worth less - and signal of confidence in firm)

Collateral – asset on which bank has first claim if default occurs

Distinguish inside and outside collateral

Cost of collateral – repossession and monitoring costs

Benefits (i) collateral can directly reduce bank risk (ii) signalling willingness to avoid risk (avoid adverse selection)

(iii) avoid moral hazard problems such as

- asset substitution (borrower seeks riskier projects owing to option)
- inadequate effort supply

Conditions - affecting borrower's ability to repay

Sources of credit information

- Internal, interview, records, risk model
- External, e.g. financial statements of borrower
 - oIncome statement for long term loan
 - oBalance sheet for short term loans

Loan covenants

- Affirmative (obligation to borrower)
- Restrictive (limit borrower actions)
- Negative (prohibit actions)
- Default (conditions for repayment)

Loan pricing

Steps in choosing interest rate:

- Assessment of income and expenses
- Benchmark interest rate selection
- Compensating balances
- Borrower risk - trade-off for high risk

Macro effects which should influence lending margins: cyclical pattern of loan losses (see equation, Davis 1993)

- provisioning linked to GDP, interest rates, bankruptcies and corporate gearing also strong link to balance sheet growth (adverse selection)

Industry risk and portfolio effects that should influence loan pricing (see correlations)

- differing mean, variance and covariance
- property highlighted
- skewed distribution of losses

Econometric equation for provisioning (major UK bank, half yearly data, 1972-90)

Key	PROV = New and increased provisions	TC = No. of extant companies
	BS = Bank balance-sheet total	KB = Stock of company bank borrowing
	RR = Real interest rate	KS = Company capital stock at current replacement cost
	GDP = Real GDP	WO = Write-offs
	CL = Company liquidations	

Cointegrating vector

$$\ln \frac{\text{PROV}}{\text{BS}} = 3.4 + 0.0034 \text{RR} - 14.0 \ln \text{GDP} + 1.7 \ln \frac{\text{CL}}{\text{TC}} + 0.73 \ln \frac{\text{KB}}{\text{KS}}$$

(3.7) (4.5) (3.9) (9.2) (2.4)

$$R^2 = 0.8; \text{SE} = 0.24; \text{DW} = 2.6; \text{DF} = -7.3; \text{ADF} = -3.4$$

Dynamic equation

$$\Delta \ln \frac{\text{PROV}}{\text{BS}} = 0.3 + 0.0017 \text{RR} - 15.3 \Delta \ln \text{GDP} + 1.93 \Delta \ln \frac{\text{CL}}{\text{TC}}$$

(2.9) (3.3) (3.0) (4.8)

$$-0.46 \text{RES}_{t-1} - 0.57 \Delta \ln \frac{\text{PROV}_{t-1}}{\text{BS}_{t-1}}$$

(1.6) (3.4)

$$R^2 = 0.78; \text{SE} = 0.23; \text{DW} = 1.5; \text{LM}(2) = 4.1; \text{RESET}(1) = 0.03;$$

$$\text{NORM}(2) = 1.8; \text{HETERO}(1) = 1.9; \text{CHOW}(4) = 3.8$$

Forecasts

	Actual	Forecast
90 H1	0.61	0.42
90 H2	0.82	0.59
91 H1	0.02	0.33
91 H2	0.41	0.28

Major UK bank – new and increased provisions as percent of sectoral lending

	Mean (%)	SD (%)	Max (%)	Beta coefficient ^a	t-value
Agriculture	0.19	0.12	0.45	0.8	(4.6)
Mining and quarrying	0.25	0.36	1.5	-1.4	(2.0)
Construction	0.66	0.55	2.83	0.9	(6.3)
Food, drink, and tobacco	0.20	0.19	0.83	1.1	(4.0)
Chemical and allied	0.23	0.28	1.15	-0.3	(0.1)
Metal manufacture	0.23	0.27	1.29	1.4	(2.2)
Electrical engineering	0.43	0.30	1.11	0.8	(3.5)
Other engineering	0.58	0.60	2.84	1.3	(4.4)
Shipbuilding	0.88	1.2	5.84	0.6	(1.0)
Motor vehicles	0.43	0.50	1.91	-0.4	(0.7)
Textiles, leather, and clothing	0.71	0.52	1.97	1.0	(2.8)
Other manufacturing	0.55	0.44	1.95	0.9	(4.8)
Property companies	0.67	0.8	3.13	1.9	(7.3)
Transport and communication	0.73	1.0	6.10	1.0	(4.6)
Central/local government	0.03	0.09	0.46	—	—
Retail distribution	0.64	0.44	2.04	0.7	(3.3)
Other distribution	0.44	0.31	1.27	0.7	(3.4)
Insurance and pensions	0.09	0.24	1.3	—	—
Other financial	0.42	0.60	2.75	1.9	(2.8)
Professional/scientific/ miscellaneous	0.59	0.43	2.15	0.7	(6.3)
House purchase	0.06	0.06	0.2	0.9	(4.9)
Other personal	0.76	0.64	2.83	0.6	(6.3)
Total excluding financial and personal (TE)	0.54	0.36	1.8	1.1	(25.6)
GRAND TOTAL (GT)	0.49	0.30	1.62	—	

^a Coefficient β in regression: $\Delta \ln(\text{sectoral provisions}) = \alpha + \beta \Delta \ln(\text{total provisions})$

Credit rationing – corollary of loan pricing

Definition - lender refuses credit to borrower at a price set by itself

Macro aspects: Link to monetary policy

Less interesting case “disequilibrium quantity rationing”

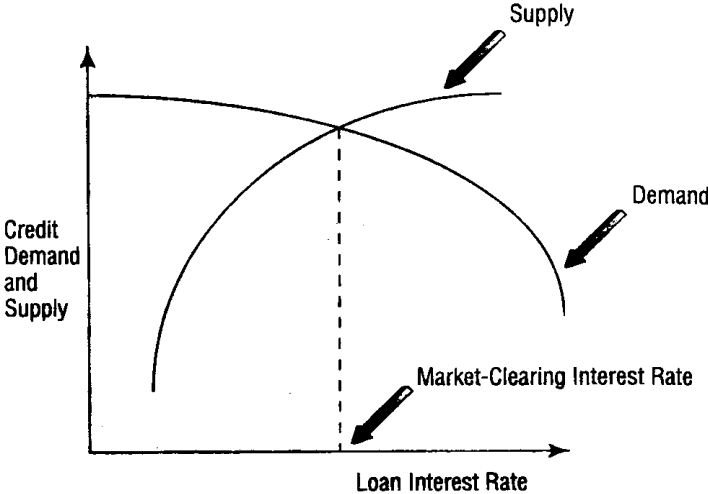
Case of “equilibrium quantity rationing” (see diagrams)

Adverse selection and moral hazard

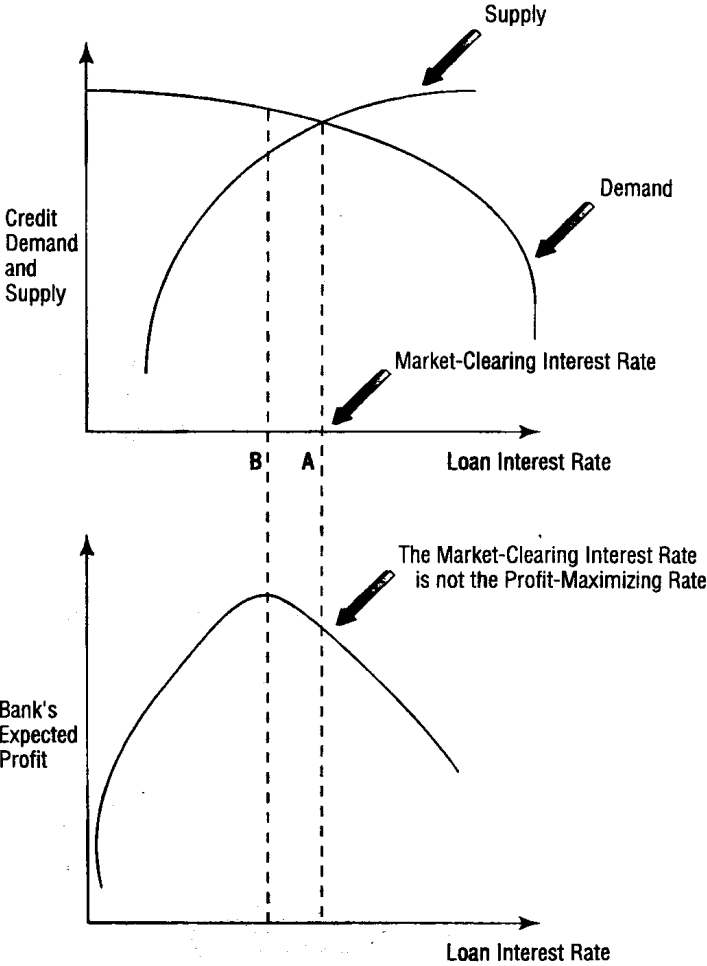
Bank capital and credit rationing

Micro aspects: Spot lending decisions - whether to get more costly information about a borrower, and whether to extend credit if have decided to stop gathering. Sequential process of information gathering and evaluation. Rationing in the large (reject all once reach loan maximum) and the small (reject undesirables before reach maximum)

Credit market equilibrium



Credit rationing



Customer relationships

Link to “commitment” paradigm of intermediation

Reduces moral hazard as firm knows it will need the bank again. Need for the bank to commit itself to be time consistent

Reduces information asymmetry (see Bayes rule)

Private information reusability

- reduces costs for bank
- improved credit terms
- facilitates debt restructuring rather than bankruptcy
- could lead to exploitation of borrower

Risks in secured lending - particular reference to real estate

Why do banks overlend to real estate?

- alternatives?
- Collateral
- Balance sheet growth

Issues

- externalities of lending severe
- potential “disaster myopia”
- vulnerability to macroeconomic shocks

Example of the consequences - Swedish banking crisis

Swedish banking crisis

Financial liberalisation – banks and authorities unfamiliar with liberalised regime

Growth in bank lending (140% 1985-90) and private sector debt, particular focus on real estate lending, encouraged by tax deductibility

Market share competition among banks

Shocks - global recession, high interest rates to hold exchange rate, tax reform abolishing interest deductibility

Majority of banks insolvent, non performing assets 14% of GDP

Cost of public rescue 4.5% of GDP