

EC372 Bond and Derivatives Markets
Topic #9: Financial Intermediation, I: Fundamentals

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Outline

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Reading: *Lecture notes* (available in the CMR)

1 Functions of Financial Intermediaries

Functions of Financial Intermediaries

1. Payments system – a mechanism for the transfer of cash, via bank deposits.
2. Risk sharing – dividing up the risks associated with large assets that would otherwise be indivisible.
3. Risk pooling – by holding a portfolio of assets with imperfectly correlated returns, the intermediary can control the risks associated with its aggregate portfolio, thus offering its investors (e.g. depositors of banks) more secure returns.
4. Delegated monitoring – controls that serve to manage the incentives of borrowers, to ensure good behaviour
5. Dissemination of information – collecting and presenting information to guide investors in their decisions

Financial intermediaries: banks and others

- Institutions *evolve* to perform the functions – adapt to changing circumstances, e.g. regulation, technology.

- Banks exist in several varieties, with differing functions.
‘Commercial banks’ are typical: accept depositors funds, which are then loaned out (deposits commonly being repayable on demand but loans of several months, or years, duration). ‘Investment banks’ may not accept deposits at all but focus on providing services to corporations, e.g. arranging mergers, share-offerings, underwriting bond issues, organising take-over bids.
- Are (commercial) banks special? Creators of money?
It is, at best, misleading to claim that banks are unique ‘creators of money’: their liabilities are widely accepted as a medium of exchange, a close substitute for state issued currency. Hence, banks’ actions can amplify or obstruct central bank monetary policy. It’s a gross oversimplification to assert that banks can create money.
- Other financial intermediaries include insurance companies, hedge funds, private equity funds, pension funds, even financial exchanges. They perform various functions. Thus, for example, insurance companies carry out risk sharing, among other functions.

2 Bank risks: a Balance Sheet Approach

Banks’ Balance Sheets

- Why look at a bank’s ‘Balance Sheet’? – useful way of classifying risks of financial distress.
- Liabilities:
 - *Net Worth* – shareholders’ equity Net Worth is what’s left over after subtracting the bank’s obligations from its assets; hence what is ‘owed’ to the bank’s owners, or its ‘capital’; also interpreted as the ‘value of the bank’, noting that it’s the ‘book value’ (estimated from the accounts) rather than the ‘market value’ (which reflects shareholders’ estimates of the worth of the firm).
 - *Bonds* – contractual obligations, typically long-term debt
Very often much of this debt is in the form of marketable bonds, possibly with a variety of terms to maturity.
 - *Deposits* – contractual obligations, repayable at short notice
For commercial banks, the deposits may be withdrawn by depositors on demand or after a delay of a few months. Banks also borrow at short term, e.g. overnight, from other financial intermediaries, commonly pledging securities as collateral (using REPO agreements).
- Assets:
 - *Loans* – contractual agreements with banks’ borrowers
These are non-marketable in the sense of contracts between the bank and a named company, or person, which is obliged to make a specific sequence of payments of interest and principal to the bank. Traditionally, commercial banks made loans of short duration – say, three months to maturity – via ‘advances’ or ‘overdrafts’. Following liberalisation of regulations in the 1980s, an increasing proportion took the form of longer term lending, e.g. mortgages on real estate.
 - *Securities* – marketable securities held by the bank
Comprises a heterogeneous collection of securities including debt and equity.

- *Reserves* – cash and close substitutes for cash

A portion of reserves held as cash or deposits at the Central Bank may be designated as reserves for regulatory purposes, but additional quantities of liquid assets may also be held at the bank's discretion.

Banking risks: assets

- Credit risk – loan default or default on securities held
- Market risk – fluctuations in security prices
- Interest rate risk – changes in interest rates on assets held by the bank
- Liquidity risk – inability to realise the expected value of an asset when sold

Remember that the above is merely a convenient classification: the various sorts of risk overlap (e.g. default is merely an extreme form of market risk as is liquidity risk). Ultimately, they are just different ways of thinking about circumstances in which a bank's aggregate assets may decline.

Banking risks: liabilities

- Bank run – abrupt reduction in a bank's deposits
This is the classic bank risk in which depositors demand return of their funds more quickly than the bank can liquidate its assets to pay them.
- Inability to borrow from other banks In a crisis, a fall in the value of a bank's assets that normally provide collateral for inter-bank borrowing may mean that its capacity to raise funds using REPOs may be drastically diminished.
- Stems from the 'mismatch of maturities' – banks borrow short and lend long.
- Inadequate capital – inability to raise new capital Given that 'Net Worth' reflects total assets net of liabilities, a fall in the value of a bank's assets relative to its debt and deposits, means that the bank finds it costly (difficult) to raise new capital, either to fulfil regulatory requirements or even just to stay solvent.

2.1 Regulation

Regulation: objectives

- Economic Stability
The quest to ensure that financial intermediation contributes to economic success in the 'real' (i.e. non-financial) sector, and that it does not jeopardise economic performance.
- Equitable treatment
Reflects state support for honesty and the rule of law.
- Rent seeking – regulatory capture
Reflects attempts by the state, the banks, and others, to extract gain ('rent') from regulations that typically restrict competition among banks.

Regulation: methods

- Deposit insurance – recompense to depositors in event of default
Banks ‘pay’ for the insurance either explicitly with a premium and/or implicitly with an obligation to obey regulations about the composition of their assets and the amount of their capital.
- Liquid reserves – stipulates minimum amount of liquid assets
Also regulations may specify the range of assets that are permissible in satisfying the minimum.
- Capital requirements – obligation to maintain net worth.
Banks in most jurisdictions are required to maintain minimum capital ratios (Net Worth as a proportion of Total Assets) in accordance with ‘Basel II’ or ‘Basel III’ protocols – higher ratios are imposed by some authorities.
- Range of activities – some activities may be ‘ring fenced’
Example: proposed legislation to restrict the uses that commercial banks may make of depositors – typically limiting the range of assets that the bank holds.
- Lender of last resort – emergency support from the Central Bank
In order to be eligible automatically to borrow from the Central Bank when needed, banks must comply with regulations about their behaviour, including restrictions on the range of securities allowed as collateral for emergency loans.

3 Securitisation

Securitisation

- *Securitisation* – creation of marketable (‘liquid’) securities
The newly created securities are backed by other assets that are less liquid, commonly non-marketable debt, e.g. mortgages, corporate loans, car loans.
- *Asset Backed Securities* (ABSs) – the result of securitisation
The ‘backing’ (illiquid) assets provide the payoffs and collateral for ABSs.
- *Collateralised Debt Obligations* (CDOs) – common type of ABSs
- *Structured Investment Vehicles* (SIVs) – legal entities that originate ABSs
Commonly financial institutions set up separate SIVs to issue and service ABSs, rather than to issue them directly.
Each SIV is a stand-alone entity – not a liability of the originator.
- *Tranches* of ABSs – liabilities of ABSs can be heterogeneous
Each ABS inherits the credit risk of its backing assets. ABSs typically are split into several *tranches* each with a different credit rating, e.g. AAA, BBB+, BB–.

Asset Backed Securities

- ABS illustration, with three tranches:
 - Senior – safest (often rated AAA)
The senior tranche has first call on the backing assets' payoffs
 - Mezzanine – moderately safe
Payoffs are contingent on fulfilling obligations to senior tranche.
 - Equity: residual claims (risky)
Payoffs contingent on fulfilling obligations on all other tranches of the ABS. The originating bank often holds some portion of these risky, 'toxic', securities.
- *Incentive* for creating ABSs – direct and indirect gain
 - Originator obtains immediate funds (backing assets typically held to maturity); used to make loans; hence backing for further ABSs.
 - '*Regulatory arbitrage*': originator avoids capital requirements to cover loan portfolios.
 - Investors obtain low-risk, liquid, high-return bonds (senior tranche).
- *Multi-layered products* – cascades of bonds
Backing assets for an ABS (e.g., a CDO) may be tranches of other ABSs.
- *Synthetic ABSs* – created from *Credit Default Swaps*

ABS: consequences

- Risk pooling and spreading – managing (limiting?) risk
 - ABSs *pool risks* of the many different assets that back them; helps if backing assets' payoffs are *uncorrelated* with one another (at least, the payoffs should not be perfectly correlated).
 - ABSs enable *risk-spreading*: different risks from different tranches
- *Marking to market* with '*fair value accounting*'
 - Most financial companies are required to report assets at fair market value, essentially the asset's *current market price*
 - Problematical for rarely traded securities, e.g. ABS equity tranches
 - Holding assets to maturity may yield very different payoffs from yields implied by current market price (simply reflects *uncertainty*)
- Credit ratings of ABSs – often *unreliable* in 2007/09
 - Composition of ABSs is often *opaque*.
 - Credit ratings are statistical estimates, hence *prone to error*.
 - How *independent* are credit rating agencies of ABS originators? Not as much as they could be.

4 A Screening Model of Bank Lending

Intermediation as Delegated Monitoring

- Screening is a form of ‘*delegated monitoring*’ in which investors delegate to banks the responsibility of monitoring the firms which seek to borrow
- Banks screen (scrutinise) all requests for loans – but *lend only to ‘good’ borrowers*.
- Three sets of decision-makers (all risk-neutral):
 1. *Firms* – potential borrowers, two types ‘good’ & ‘bad’
 2. *Investors* – hold bonds or a risk-free asset
 3. *Banks* – screen firms but lend only to ‘good’ firms

Screening: Firms as Borrowers

- All firms invest in a project with *initial cost “1”* with payoff X if successful, 0 otherwise.
- Proportion ν_H firms are ‘good’, ν_L are ‘bad’, ($\nu_H + \nu_L = 1$).
- Good firms: probability of success θ_H
- Bad firms: probability of success θ_L
- Assume: A.1. $\theta_H > \theta_L$;
A.2. $\theta_H X > 1$ and $\theta_L X < 1$;
A.3. $\bar{\theta} X > 1$ where $\bar{\theta} \equiv \theta_H \nu_H + \theta_L \nu_L$

Screening: Banks only equilibrium

- Notation: γ = proportion of good firms that issue bonds.
 $\gamma = 0 \iff$ banks only equilibrium
- Let C = screening cost per firm
- Assuming perfectly competitive banks, loan interest rate R_L is:

$$R_L = \frac{1}{\theta_H} + \frac{C}{\nu_H \theta_H}$$

Explanation: banks will lend only if net profits are non-negative:

$$\nu_H \theta_H R_L - C - \nu_H \geq 0 \quad (\text{expected revenue is no less than cost})$$

Competition then drives net profit to zero.

- Existence of banks only equilibrium requires: $R_L \leq X$ (otherwise no firm would borrow from a bank).

Screening: Bonds only equilibrium

- Let $R_B(\gamma)$ = bond interest rate.
- With bonds-only, $\gamma = 1$
- Two conditions required: $R_B(1) \leq X$ and $R_B(1) \leq R_L \leq X$ – in words: the bond interest rate is no greater than the payoff from a successful project; and the bond interest rate is no greater than the bank loan rate (otherwise no firms would issue bonds).

The second inequality, $R_B(1) \leq R_L$ implies:

$$\frac{1}{\bar{\theta}} \leq \frac{1}{\theta_H} + \frac{C}{\nu_H \theta_H}$$

- If $R_B(1) \leq X$ then $R_B(1)\bar{\theta} \geq 1$ Explanation: if $R_B(1) \leq X$, the probability of success for a unit investment in bonds equals $\bar{\theta}$ (note that investors cannot distinguish between good and bad firms). Thus, investors – who are risk-neutral – will purchase bonds if and only if $R_B(1)\bar{\theta} \geq 1$ (“1” is the opportunity cost of funds, assuming a zero risk-free interest rate).
- Competition then implies $R_B(1) = 1/\bar{\theta}$

Screening: Both bonds and banks

- Assume proportion $(1 - \gamma)$ of all firms seek bank loans.
- Only the good firms obtain a loan
- \Rightarrow proportion γ of good firms and *all* bad firms issue bonds
- Thus: $R_B(\gamma)$, satisfies:

$$(\gamma\theta_H\nu_H + \theta_L\nu_L)R_B(\gamma) = \gamma\nu_H + \nu_L$$

In words: the expected payoff from a unit investment in bonds, $(\gamma\theta_H\nu_H + \theta_L\nu_L)R_B(\gamma)$ equals the expected opportunity cost of a unit of investment,¹ $\gamma\nu_H + \nu_L$.

- Also: $R_B(\gamma) = R_L$ (Firms are indifferent between issuing a bond or obtaining a loan.)

Screening: Implications

- Crucial parameter determining equilibrium type is C .
- Multiple equilibria may exist: if ‘banks and bonds’ exists, so does ‘banks only’ equilibrium.
- With multiple equilibria, the model cannot predict which will occur.
- Efficiency: compare net expected output among the equilibria.

The ‘bonds only’ equilibrium has social costs inasmuch as bad firms issue bonds that yield a negative expected payoff.

With ‘banks only’, bad firms are not financed but there is a cost to society because all firms are screened: the cost of screening all firms may exceed the negative expected payoff from bad firms that would have issued bonds if the market had existed.

¹Remember that the risk-free interest rate is assumed to be zero.

With an interior equilibrium (both banks and bonds), there is a trade-off: fewer firms are screened, thus saving the screening costs of firms that go directly to the bond market, but this saving is offset – at least partially – by the negative expected payoff on bonds issued by bad firms.