Lecture III: Banks as Institutions

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Banks in Economic Theory

- The credit market developed in Lecture II is similar to most models developed in microeconomic theory - long on concept an short on real world actors.
- Today's economy has developed a host of institutions to facilitate these transactions between lenders and borrowers (or savers and borrowers) such as banks and stock exchanges.
- These institutions (banks and stock exchanges) act within regulated frameworks established by government or near government entities such as the Comptroller of the Currency and the Federal Reserve System.
- This lecture develops the role of banks within the financial market and an overview of the regulators that affect these banks ability to serve agriculture and agribusinesses.

The Bank's Balance Sheet

- It is easy to describe the operation of a commercial bank through the operation of its balance sheet.

$$\text{Assets} = \text{Liabilities} + \text{Equity} \tag{1}$$

- The right hand side of Equation 1 lists the assets that any organization owns.
  - In the case of commercial banks assets include reserves (including vault cash and reserves held at the Federal Reserve System), checks written on account at other banks, deposits at other banks, securities, loans, and other assets (Mishkin, 2004).
- The liabilities include checkable deposits, non transaction deposits and debt.
- Finally, the equity account may include capital stock (both common and preferred stocks) as well as retained earnings.

Aggregation of Capital for Lending

- The primary business activity of banks is to transform assets.
  - Individuals deposit checking accounts, certificates of deposits, etc. with the bank.
  - The banks use these assets to create consumer and business loans.
- This transformation yields assets of different liquidity, risk, size, maturity, and return.
  - For example, checking accounts are typically deposits of short duration.
  - It is clear that the liquidity demands of checking accounts are ill suited for housing loans (mortgages).
  - The bank aggregates the deposits of a large number of checking accounts – the cash-flow demands of depositors average out yielding a near constant level of capital which can be loaned for home ownership.

Effect on Risk and Return of Loan Portfolio

- The bank's transformation from into larger pools of loanable funds also changes the relative risk and return to depositors.
- Bundling loans together produces a loan portfolio which has less risk on lending.
- Mathematically the mean rate of return on the portfolio of loans (μ_P) based on the expected individual returns on each loan ($\mu_i \; i = 1, 2, 3$) and the level of each loan ($x_i \; i = 1, 2, 3$) can be expressed as

$$\mu_p = \mu_1 x_1 + \mu_2 x_2 + \mu_3 x_3 \tag{2}$$

Effect on Risk and Return of Loan Portfolio - Continued

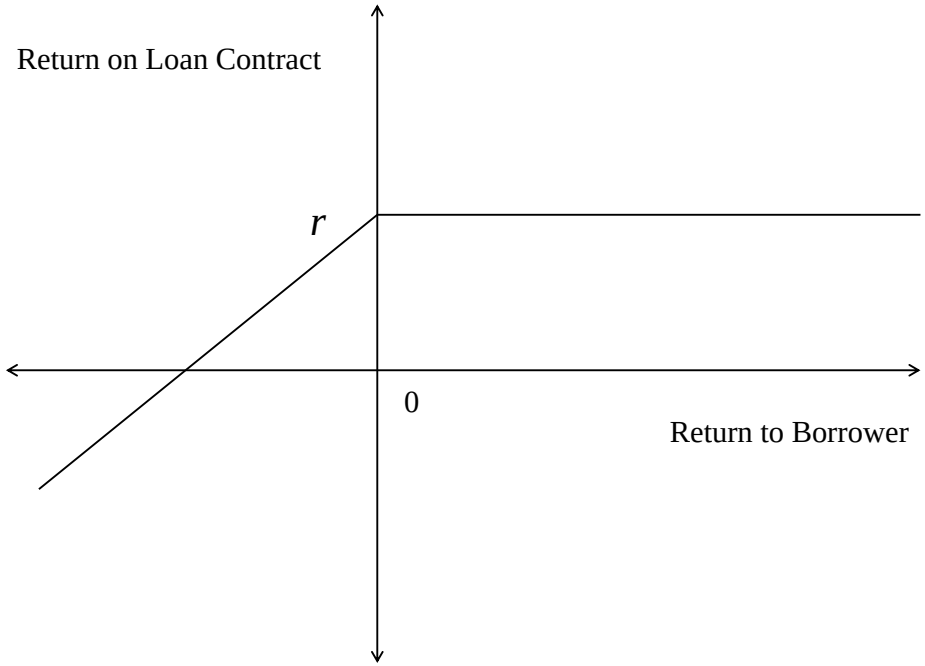
- The variance of the return on the lending portfolio can be expressed as

$$\sigma_p^2 = \sigma_{11}x_1^2 + 2\sigma_{12}x_1x_2 + 2\sigma_{13}x_1x_3 + \sigma_{22}x_2^2 + 2\sigma_{23}x_2x_3 + \sigma_{33}x_3^2 \tag{3}$$

  where σ_{ii} is the variance of the returns to a particular loan and σ_{ij} is the covariance in the return between loan i and loan j.
- Most students have had an introduction to the variance in statistics classes.
  - The variance is most meaningful when the variables are normally distributed.
  - Unfortunately, the return function for loans does not obey normality.

Payoff Function for Loans

- The return on a loan is positive as long as the borrower makes enough money to repay the loan.



Kinked Payoff Function

- If the borrower has no capital in the endeavor, and if the investment earns a negative profit, one alternative is for the borrower to default - simply giving the lender all the assets associated with the investment at the end of the contract.
- This "kinked" payoff has a defined variance coefficient, but the covariance between one loan and another loan is not strictly appropriate in the case of the loan contract.
- abstracting past this measurement problem it is clear that the risk of the loan portfolio (measured by the variance of the return to lending) is a function of these covariance terms.

Kinked Payoff Function - Continued

- If we assume that the returns on the loans are independent, the covariances are equal to zero and the overall risk is the same as making each loan independently.
  - The risk to each depositor is smaller than investing in a single loan.
  - Given that banks historically chartered to a geographically limited area the covariance coefficients are probably greater than zero limiting the effectiveness of diversification somewhat.
- Following the discussion from pages 24 - 26 in the textbook, we observe the return on the loan portfolio based on this "kinked" payoff function

Bank Returns on Three Loan Classes

Year	Class 1	Class 2	Class 3	Portfolio
1	0.0317	0.0709	0.0463	0.0496
2	0.0573	0.0375	0.0417	0.0457
3	0.0570	0.0341	0.0415	0.0410
4	0.0304	0.0197	0.0466	0.0340
5	0.0750	0.0346	0.0561	0.0400
6	0.0750	-0.0040	-0.0139	0.0190
7	0.0750	0.0744	-0.0028	0.0488
8	0.0095	-0.0043	0.0600	0.0217
9	0.0750	-0.0652	0.0459	0.0186
10	-0.0072	0.0100	-0.0229	-0.0067
Avg.	0.0479	0.0208	0.0298	0.0312
Std.	0.0301	0.0405	0.0306	0.0179

Bank Returns - Correlation Matrix

	Class 1	Class 2	Class 3
	Covariance Coefficients		
Class 1	0.00082	-0.00001	0.00005
Class 2		0.00148	-0.00007
Class 3			0.00085
	Correlation Coefficients		
Class 1	1.0000	-0.0121	0.0581
Class 2		1.0000	-0.0639
Class 3			1.0000

Benefits for the Borrower

- While each of these advantages have been developed in the context of the depositor, the borrowers also borrow from this transformation function.
- Aggregation of deposits in size and over time clearly reduces the transaction cost to the borrower.
- the diversification function reduces the return on the debt instrument that would be required by individual borrowers.

Other People's Money

- A critical feature of modern banking is that they operate using other people's money - typically depositors.
- This use of other people's money is different than other firms who manage other people's money through bonds and capital stocks.
  - Managers not only manage the traditional fiduciary arrangement but also provide transaction services for depositors in the short-run.
  - The effect of bank operations on the economy's liquidity brings bank operations under the regulation of macroeconomic authorities such as the Federal Reserve System.

Although these institutions and their successors differed in many ways from each other, they were united - and distinguished from there forebears-in two important characteristics. First, these were wholly private institutions. Predecessors institutions of the seventeenth century had been either founded or managed by, or established primarily for the benefit of, the state or municipality.... Second, these banks had a corporate form of organization.... The incorporation of banks had several important effects. First, unlike partnerships, which might be dissolved or require reorganization upon the death of one of the partners, corporations could exist, in theory, indefinitely. Second, the corporate form of organization made it easier for banks to amass funds from a large pool of shareholders, enabling corporations to command more resources than partnerships (Grossman, 2010, p.28).