# Solutions for End-of-Chapter Questions and Problems: Chapter Seventeen

1. Explain how technological improvements can increase an FI’s interest and noninterest income and reduce interest and noninterest expenses. Use some specific examples.

Technological improvements in the services provided by financial intermediaries help increase income and reduce costs in several ways:

(a) Interest income: By making it easier to draw down on loans directly via computers, as well as by processing loan applications faster.

(b) Interest expense: By enabling banks to access lower cost funds that are available directly from brokers and dealers through computers and screen-based trading.

(c) Noninterest income: By making more nonloan products available to customers through computers to customers such as letters of credit, commercial paper and derivatives.

(d) Noninterest expense: By reducing processing and settlement fees, an area that has changed drastically for most FIs, especially in trading activities and in the use of automated teller machines (ATMs) and home banking capabilities.

2. Table 17-1 shows data on earnings, expenses, and assets for all insured banks. Calculate the annual growth rates in the various income, expense, earnings, and asset categories from 1991 to 2010. If part of the growth rates in assets, earnings, and expenses can be attributed to technological change, in what areas of operating performance has technological change appeared to have the greatest impact? What growth rates are more likely to be caused by economy-wide economic activity?

Growth rates through the end of 2010:

Category Twenty-Year Growth Rate

Interest income 2.58%

Interest expense -3.08%

Net interest income 6.02%

Provision for Loan Loss 7.54%

Noninterest income 6.65%

Noninterest expenses 5.41%

Net earnings 7.59%

Total assets 6.49%

The high growth rate in noninterest income reflects in part, the additional fees for technology oriented products such as ATMs and other services. The smaller growth in noninterest expense reflects a lower growth in personnel expenses that further supports the transition toward more technology. The relatively small growth rates in interest income and decrease in interest expense reflect the low interest rate environment of the economy that was prevalent during the 2000s. The growth in net earnings, which is larger than the growth in assets, is fueled by all of the above.

3. Compare the effects of technology on an FI’s wholesale operations with the effects of technology on an FI’s retail operations. Give some specific examples.

Generally, the wholesale efforts have centered on the FIs’ ability to improve the management of float and technological operating efficiency for large corporate customers. These efforts include services dealing with lockboxes, funds concentrations, treasury management software, etc. The effect on retail services primarily has been to make it easier for individuals to obtain banking services as exemplified by ATMs and web-based home banking products.

4. What are some of the risks inherent in being the first to introduce a financial innovation?

One risk is that the innovation may not be successful, because of either lack of acceptance by the customers of the FI or problems with the design and delivery of the product. If the product is successful, competitors may be able to quickly duplicate the product without incurring similar development cost of the original innovator. Another risk involves agency issues in which an employee recommends and/or pushes for new products or expansion which may not be in the best interests of the shareholders.

5. The operations department of a major FI is planning to reorganize several of its back-office functions. Its current operating expense is $1.5 million, of which $1 million is for staff expenses. The FI uses a 12 percent cost of capital to evaluate cost-saving projects.

a. One way of reorganizing is to outsource a portion of its data entry functions. This will require an initial investment of approximately $500,000 after taxes. The FI expects to save $150,000 in annual operating expenses after taxes for the next seven years. Should it undertake this project?

This is a traditional capital budgeting problem. Investments = $500,000, and annual cost savings = $150,000. NPV = CF x PVAk=12%, n=7 – Investment, where *k* = FI’s cost of capital and CF = cash flows or cost savings. NPV = $150,000 x PVAk=12%, n=7 -500,000 =

$684,563.48 - $500,000 = $184,563.48. Yes, the FI should undertake this project.

b. Another option is to automate the entire process by installing new state-of-the-art computers and software. The FI expects to realize more than $500,000 per year in after-tax savings, but the initial investment will be approximately $3 million. In addition, the life of this project is limited to seven years, at which time new computers and software will need to be installed. Using this seven-year planning horizon, should the FI invest in this project? What level of after-tax savings would be necessary to make this plan comparable in value creation to the plan in part (a)?

NPV = $500,000 x PVAk=12%, n=7 - $3,000,000 = -$718,121.73. No, the FI should not undertake the project under these terms. The level of after-tax savings necessary to make the plan comparable to part (a) is NPV = Savings x PVAk=12%, n=7 - $3,000,000 = $184,563.48, ⇒ Annual savings = $697,794.34 over the seven-year period.

6. City Bank upgrades its computer equipment every five years to keep up with changes in technology. Its next upgrade is two years from today and is budgeted to cost $1 million. Management is considering moving up the date by two years to install some new computers with breakthrough software that could generate significant cost savings. The cost for this new equipment also is $1 million. What should be the savings per year to justify moving up the planned update by two years? Assume a cost of capital of 15 percent

The equivalent annual cost for the planned 5 years is $1,000,000/PVAk=15%, n=5 = $298,315.55. Since the cost of the planned improvement is the same as the original investment, the savings generated should be the present value of $298,315.55 in years 1 and 2, or a total of $484,974.24.

7. Identify and discuss three benefits of technology in generating revenue for FIs?

Technology (1) allows for more efficient cross-marketing of new and old products; (2) encourages an increase in the rate of innovation of new products; and (3) supports improvements in service quality and convenience. Many FIs use high-tech efforts to determine how they can reach more customers with more products. As marketing lines are identified and defined, new product ideas emerge that further the usefulness of FI products to customers.

8. Distinguish between economies of scale and economies of scope.

Economies of scale refer to the average cost of production falling as output of a firm increases, and thus reflect the benefits of a single product firm getting larger. Economies of scope refer to the average cost of production falling through the use of joint inputs to produce multiple products, and thus reflect the benefits of a single-product firm becoming a multi-product firm.

9. What information on the operating costs of FIs does the measurement of economies of scale provide? If economies of scale exist, what implications do they have for regulators?

Economies of scale provide a measure of the average costs of producing a unit of output and usually are measured as total costs over on- and off-balance-sheet total assets, total loans, or total deposits. If average costs decline as the size of the firm increases, large FIs will be able to offer more competitive rates than their smaller counterparts and possibly drive them out of business. This is easier today because the costs of incorporating new technology can be very expensive to small FIs. Regulators have to be concerned about economies of scale, because, if it is true that larger firms have lower operating costs, policies on restricting mergers, especially vertical mergers, may be counterproductive, since social benefits may outweigh the social costs of mergers.

10. What are diseconomies of scale? What are the risks of large-scale technological investments, especially to large FIs? Why are small FIs willing to outsource production to large FIs against which they are competing? Why are large FIs willing to accept outsourced production from smaller FI competition?

Diseconomies of scale occur when the average cost of production increases as the amount of production increases. The risks of large-scale technological investments have to do with whether the uncertain future cash flows will be sufficient to cover the fixed costs of development and installation of the systems. The costs of excess capacity and cost overruns due to integration problems can easily absorb the expected benefits from the expansions. As a result, large FIs will accept production from smaller competitor FIs if such acceptance will assure that the desired cost benefits are obtained. At the same time, small FIs are willing to outsource production in an attempt to gain the benefits of lower production expenses that may be unattainable through their own technology upgrades.

11. What information on the operating costs of FIs is provided by the measurement of economies of scope? What implications do economies of scope have for regulators?

Economies of scope measure the synergistic cost savings to FIs that offer multiple products or services. For example, if an FI offers both banking and insurance services and offers them at lower costs than a bank and an insurance company offering them separately, economies of scope are said to exist. For regulators, this would mean being less restrictive on horizontal mergers where FIs are able to offer multiple services.

12. Buy Bank had $130 million in assets and $20 million in expenses before the acquisition of Sell Bank, which had assets of $50 million and expenses of $10 million. After the merger, the bank had $180 million in assets and $35 million in costs. Did this acquisition generate either economies of scale or economies of scope for Buy Bank?

Neither. The costs as a percentage of assets have increased from 15.38 percent ($20m/$130m) to 19.44 ($35m/$180m) percent for the bank. This represents diseconomies of scale.

13. A commercial bank with assets of $2 billion and expenses of $200 million has acquired an investment banking firm subsidiary with assets of $40 million and expenses of $15 million. After the acquisition, the expenses of the bank are $180 million and the expenses of the subsidiary are $20 million. Does the resulting merger reflect economies of scale or economies of scope?

This situation would represent economies of scope since different but joint operations are involved. The average cost of the separate firms was $215 million/$2.04 billion or 10.54 percent. After the merger, the average costs are $200 million/$2.04 billion or 9.8 percent.

14. What are diseconomies of scope? How could diseconomies of scope occur?

Diseconomies of scope occur when the average cost of production is higher from the joint production of services than the average costs from the previous independent production of the services. This situation can occur if the technology used in the production of a portion of the services is not sufficiently efficient for the production of the remaining services.

15. A survey of a local market has provided the following average cost data: Mortgage Bank A (MBA) has assets of $3 million and an average cost of 20 percent. Life Insurance Company B (LICB) has assets of $4 million and an average cost of 30 percent. Corporate Pension Fund C (CPFC) has assets of $4 million and an average cost of 25 percent. For each firm, average costs are measured as a proportion of assets. MBA is planning to acquire LICB and CPFC with the expectation of reducing overall average costs by eliminating the duplication of services.

a. What should be the average cost after acquisition for the bank to justify this merger?

Average cost:

Bank A = 0.20 x $3,000,000 = $ 600,000

Insurance Company B = 0.30 x $4,000,000 = 1,200,000

Pension Fund C = 0.25 x $4,000,000 = 1,000,000

Total costs = $2,800,000

The average cost after merger should be no more than 25.45 percent (= 2,800,000 / 11,000,000). If Bank A can lower its average costs to less than 25.45 percent, it should go ahead with the merger.

b. If MBA plans to reduce operating costs by $500,000 after the merger, what will be the average cost of the new firm?

If Bank A lowers its operating costs by $500,000, the average cost of the new firm will be $2,300,000/$11,000,000 = 20.91 percent.

16. What is the difference between the production approach and the intermediation approach to estimating costs functions of FIs?

The production approach assumes FIs use labor and capital to produce two outputs: deposits and loans. The intermediation approach assumes the function of FIs is to intermediate between borrowers and lenders. As a result, the inputs consist of capital, labor, and deposits.

17. What are some of the conclusions of empirical studies on economies of scale and scope? How important is the impact of cost reductions on total average costs? What are X-inefficiencies? What role do these factors play in explaining cost differences among FIs?

Earlier studies have shown very little economies of scale except for small banks. More recent studies have shown economies of scale to exist for banks up to the $10 billion to $25 billion sector. Unfortunately, tests for these studies are very sensitive and can be influenced by the models used. Recent studies also suggest that cost-inefficiencies or costs associated with managerial performance and other hard-to-quantify factors (X-inefficiencies) may account for cost variations among FIs. Similarly, economies of scope studies are not very conclusive. Most find no evidence of benefits to offering multiple services. Finally, it is possible that some of the cost inefficiencies could be overshadowed by efficiencies in revenue generation.

18. Why does the United States lag behind most other industrialized countries in the proportion of annual electronic noncash transactions per capita? What factors probably will be important in causing the gap to decrease?

A specific reason for the U.S. lagging behind other countries is difficult to identify. However, the United States has a much higher ratio of banks per bank customer, and these banks have been slow to provide technological products that allow and encourage electronic transaction. Many experts believe the gap between the United States and other countries will narrow as the effects of nationwide interstate branching and consolidation of the financial services industry continue to be realized and as electronic transaction products become more available.

19. What are the differences between the Fedwire and CHIPS payment systems?

Fedwire and CHIPS both are electronic payments systems that transfer various transactions between FIs. Fedwire is comprised of domestic FIs linked with the Federal Reserve System, and CHIPS is a private consortium of the largest domestic and international FIs. When FIs engage in overdrafts while using the Fedwire system, the counterparty is safe even if the FI fails because the Federal Reserve guarantees any payments made over the wire. However, in the case of CHIPS, the transactions are only tentative and are confirmed only at the end of the day. In the event of an FI failure, the receipts and payments from all FIs dealing with the failed FI are tabulated again and new debits and credits are posted. Consequently, there is a danger that a systemic default can be triggered in the event of a single failure.

20. What is a daylight overdraft? How do an FI’s overdraft risks incurred during the day differ for each of the two competing electronic payment systems, Fedwire and CHIPS? What provision has been taken by the members of CHIPS to introduce an element of insurance against the settlement risk problem?

A daylight overdraft occurs at the Federal Reserve Bank when a bank, in the continuing process of transferring in money and transferring out money from its account, has transferred out more money than is currently in the account. This is similar to the retail transaction of depositing a check and withdrawing cash before the funds from the initial check have cleared into the account. Under the Fedwire system, the Federal Reserve System guarantees all wire transfer messages, while the private CHIPS system will unwind transactions in the event that funds are not sufficient to cover the wire messages. To reduce the potential of a serious system-wide financial crisis, the members of CHIPS have created an escrow fund to cover message commitments of a failed bank.

21. How does Regulation F of the 1991 FDICIA reduce the problem of daylight overdraft risk?

Regulation F requires banks, thrifts, and foreign institutions to implement procedures to reduce their daylight overdraft exposures. As of December 1992, banks are limited from keeping overdraft positions with a correspondent bank to no more than 25 percent of the correspondent bank’s capital. If a bank is adequately capitalized, then it can have exposures of up to 50 percent of the correspondent bank’s capital. For well-capitalized banks, there is no limit.

22. Why do FIs in the United States face a higher degree of international technology risk than do the FIs in other countries?

In recent years the United States has been at the forefront in making technology investments and financial service innovations in the payments system. Indeed, the world looks to American innovation and entrepreneurship in building new banking technology and service (two areas in which the U.S. leads the world) to attract new customers. This suggests that U.S. financial service firms have often been unable to transfer profitably their domestic technological innovations to international markets to gain competitive advantage, at least in the short term.28 In contrast, foreign financial service firms entering the U.S. market gain direct access to, and knowledge of, U.S. technology–based products at a very low cost. For example, since the passage of the International Banking Act in 1978, foreign banks have had direct access to U.S. Fedwire.

23. What has been the impact of rapid technological improvements in the electronic payment systems on crime and fraud risk?

The massive increase in the use of electronic payment mechanisms has greatly increased the level of sophistication required to commit unauthorized transfers by accessing computers illegally. However, knowledge of specialized technical information has created a new type of white-collared crime and thus security problems.

24. What are usury ceilings? How does technology create regulatory risk?

Usury ceilings are state government imposed limits that FIs may charge on certain types of lending activities, such as consumer loans and credit cards. Because many product transactions rely heavily on electronic technology, financial products often can be marketed from locations without severe regulatory constraints. This activity in effect circumvents the regulatory effects desired in the constrained environments.

25. How has technology altered the competition risk of FIs?

Competition in the financial services industry has increased because of the entrance of nontraditional financial service providers, such as industrial loan corporations (ILCs), through the use of technology. Thus, the franchise values of traditional service providers, such as banks, savings institutions, etc., are under increasing pressures from the new, technology-based, nontraditional providers.

1. What actions has the BIS taken to protect depository institutions from insolvency due to operational risk?

In 1999 the Basle Committee (of the BIS) on Banking Supervision said that operational risks “are sufficiently important for banks to devote necessary resources to quantify the level of such risks and to incorporate them (along with market and credit risk) into their assessment of their overall capital adequacy.” In its follow up consultative document released in January 2001 and April 2003, the Basle Committee proposed three specific methods by which depository institutions (DIs) would hold capital to protect against operational risk. These methods were implemented in 2006.