FINANCIAL ASPECTS OF INDUSTRIAL LEASING DECISIONS: IMPLICATIONS FOR MARKETING

Dissertation for the Degree of Ph. D.
MICHIGAN STATE UNIVERSITY
PAUL FRANCIS ANDERSON
1976

This is to certify that the

thesis entitled

FINANCIAL ASPECTS OF INDUSTRIAL LEASING DECISIONS: IMPLICATIONS FOR MARKETING

presented by

Paul Francis Anderson

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Business Administration

William Lazer
Major professor

Date March 31/76

O-7639


MISTAKE

ABSTRACT

FINANCIAL ASPECTS OF INDUSTRIAL LEASING DECISIONS: IMPLICATIONS FOR MARKETING

by

Paul Francis Anderson

Statement of the problem. Despite the growing importance of leasing in the industrial market, little research has been done on the subject of lease marketing. This is particularly true with regard to the financial aspects of full-payout leases. The full-payout lease is essentially a financial device which has the potential to provide the lessee with a set of economic benefits. The dissertation focuses upon the nature of these benefits and the analytical techniques employed by industrial firms in making lease versus purchase decisions. The research seeks to identify the lease marketing implications of the decision procedures employed by industrial organizations.

Methodology. A mail survey was conducted to determine the financial analysis methodologies employed by large industrial firms in making lease versus purchase decisions. A research instrument consisting of a lease case problem and a questionnaire was sent to the 200 largest industrial firms in the United States listed by Fortune magazine.

The respondents were asked to analyze the lease-purchase case using the methodology they would normally employ for similar leasing

decisions. The questionnaire provided supplemental information on the case analysis and the data necessary to develop a respondent profile.

Results and conclusions. Returns were received from 63 companies, a response rate of 31.5 percent. The 57 corporations which chose to identify themselves represent a combined 1974 sales volume in excess of $215 billion and have a median sales figure in the neighborhood of $2 billion. The major fiding of the survey is that a majority of the respondent firms apply analytical techniques which are biased in favor of the purchase alternative. This bias stems from two factors: (1) a majority of the methodologies do not properly adjust for the differential risk element in the decision, and (2) many of the decision procedures require a justification of the investment on the basis of purchase before consideration is given to leasing. Failure to adjust for risk differences in the cash flows tends to overstate the "costs" of leasing in both net present value and internal rate of return models. Furthermore, the requirement that an acquisition must first be justified on an ownership basis does not allow for the existence of unusually attractive lease terms which are sufficient to reverse an original negative purchase decision.

The results indicate that an important opportunity exists for lease marketers to educate industrial firms to lease-purchase models which more accurately reflect the economic advantages of leasing. The major task of the lessor is to communicate the existence and nature of these models to the relevant "analyst-influencers" within the customer's organization. This requires a planned and coordinated promotional program which places heavy emphasis upon personal selling.

Given the highly technical nature of the information which must be communicated, it is recommended that lessors adopt the marketing financial analyst concept. The marketing financial analyst is a sales representative trained in the areas of financial analysis, accounting, and taxes. The analyst operates as a member of a sales team and is responsible for communicating the financial benefits of leasing to industrial consumers. Support for the analyst is provided by the lessor's advertising and sales promotion programs. In turn, the firm's pricing, product quality, and service elements must ensure that the firm's leases offer real economic advantages to the lessee. The research suggests that a fully programmed and coordinated marketing mix which focuses upon the economics of leasing will allow lessors to better meet the capital equipment needs of American industry.

FINANCIAL ASPECTS OF INDUSTRIAL LEASING DECISIONS: IMPLICATIONS FOR MARKETING

By

Paul Francis Anderson

A DISSERTATION

Submitted to

Michigan State University

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

Department of Marketing and Transportation Administration

1976

To Robin,

The worth of that is that which it contains,

And that is this, and this with thee remains.

ACKNOWLEDGMENTS

At the completion of a dissertation one's personal sense of accomplishment is greatly exceeded by the gratitude that one feels for those who made the project possible. I consider myself very fortunate to have had the assistance and encouragement of many fine individuals, and I would like to acknowledge their contributions to this research.

I would like to thank Dr. William Lazer for his encouragement, his guidance, and, most of all, for his dedicated personal interest in the project. Dr. Lazer is the quintessential committee chairman, and I consider it a privilege to have worked under his direction.

I am also indebted to another member of the committee, Dr. Reed Moyer. The original dissertation proposal grew out of an assignment in Dr. Moyer's marketing research course. His assistance in the design of the survey and the construction of the questionnaire contributed significantly to the success of the project.

I was particularly fortunate to have Dr. James Greene as a member of the committee. His expert assistance on the financial aspects of the dissertation proved to be invaluable.

Finally, I would like to thank Mr. Sidney Rose and Mr. Thomas Eck of the American Association of Equipment Lessors for allowing me to attend their annual seminar at the University of Notre Dame. My research was significantly enhanced by the information I was able to obtain at those meetings.

TABLE OF CONTENTS

Chapter

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

THE PROBLEM

The Nature of the Problem

More than 30 years ago Russell B. McNeill warned readers of the Harvard Business Review that "there is danger . . . that adequate attention may not be given to one marketing device, not customarily considered, which is particularly useful in the distribution of many kinds of equipment: the lease or rental agreement. . . ."[1] Apparently, his warning did not go unheeded. In the three decades since the publication of McNeill's article, leasing has become an important tool in the marketing of industrial equipment.[2] Unfortunately, scholarly work on the subject of lease marketing has not kept pace with the growth of leasing in industry. This is particularly true with regard to the types of rental contracts known as financial leases.[3] Previous work in the area has tended to focus on the qualitative rather than the quantitative aspects of leasing. In general, marketers have failed to

---

[1]Russell B. McNeill, "The Lease as a Marketing Tool," Harvard Business Review 22 (Summer 1944), p. 415.

[2]Peter Vanderwicken, "The Powerful Logic of the Leasing Boom," Fortune 88 (November 1973), p. 136; and Eugene F. Brigham, "The Impact of Bank Entry on Market Conditions in the Equipment Leasing Industry," National Banking Review 2 (September 1964): 11-16.

[3]A discussion of the various types of leases will be found in Chapter II.

appreciate the fact that this type of lease is essentially a financial device whose benefits are primarily economic in nature.[1]

This focus on qualitative factors has led marketers to develop various lists of the "noneconomic" advantages of leasing.[2] McNeill, for example, concludes that the many qualitative aspects of leasing "make it difficult, if not impossible, to resolve to simple dollar comparisons the cost of renting versus purchasing machines."[3] Similarly, Babione, in the first doctoral dissertation on the subject of lease marketing, emphasizes the qualitative over the quantitative factors in the lessee's decision to lease or purchase.[4]

Eiteman and Davisson were the first writers to consider both the financial and marketing aspects of leasing.[5] They view fixed assets as "bundles of services" and recognize that the value of an asset is a function of the services it provides.[6] In their opinion, a lease is simply a means of paying for these services over an extended

---

[1]Much of the confusion on this point stems from the fact that, in general, the marketing literature does not differentiate between financial and operating leases.

[2]These will be discussed in Chapter II. [3]McNeill, p. 425.

[4]Francis A. Babione, "Marketing Equipment by Leasing" (Ph.D. dissertation, Ohio State University, 1949), pp. 321-23. It should be noted that Babione also mentions the income tax advantage which was available to lessees prior to the enactment of the 1954 tax code. He believes, however, that this benefit is somewhat "overestimated." See, Babione, p. 321.

[5]Wilford John Eiteman and Charles N. Davisson, The Lease as a Financing and Selling Device (Ann Arbor: School of Business Administration, University of Michigan, 1951).

[6]Ibid., p. 11. Eiteman and Davisson note that value is not dependent upon the transfer of legal title.

period of time. Both economic and noneconomic advantages (services) are stressed by Eiteman and Davisson. Indeed, they were the first to develop a technique for the financial analysis of lease versus purchase decisions. While the model is rather crude by contemporary standards, it represents an important first step toward the quantification of the economic aspects of leasing.[1] Unfortunately, they fail to recognize the full marketing implications of their analysis technique. The presentation of the analysis procedure is oriented toward the lessee and does not consider its significance for lease marketers. In the final analysis, the Eiteman and Davisson monograph gives little practical guidance to firms in their attempts to market the economics of leasing. They also conclude that factors other than financial considerations must play a major role in the leasing decision.[2]

Much of the work on lease marketing published since the appearance of Eiteman and Davisson's monograph has been largely descriptive or conceptual in nature.[3] Few writers have attempted to

---

[1]This model is discussed in detail in Chapter III.

[2]Eiteman and Davisson, p. 83. This is not to gainsay the importance of certain "noneconomic" benefits of leasing. It will be shown, however, that many of these noneconomic advantages reduce to economic considerations.

[3]See, for example, Wroe Alderson, Marketing Behavior and Executive Action (Homewood, IL: Richard D. Irwin, 1957), pp. 302-3; Bruce E. MacNab, "The Lease as a Device to Market Equipment" (M.B.A. thesis, Ohio State University, 1959); Alvin J. Bytwork, "The Effectiveness of Alternatives to Purchase in the Marketing of Construction Equipment through Distributors" (Ph.D. dissertation, Michigan State University, 1961); Francis A. Babione, "The Role of Rentals in Demand Stimulation," Michigan Business Review 16 (May 1964): 17-22; R. A. Perkins, "Leasing as a Marketing Tool," in Leasing of Industrial Equipment (Washington: Machinery and Allied Products Institute, 1965), pp. 40-51; Ferdinand F. Mauser, "A Universe-in-Motion Approach to Marketing," in Managerial Marketing: Perspectives and Viewpoints, 3rd ed., edited by Eugene J. Kelley and William Lazer

develop a body of normative theory in this area. The only significant exception is Bennett's 1961 paper on the marketing aspects of capital equipment leasing.[1] Bennett deals briefly with such concerns as lease pricing, product policy, sales force control, and promotion of the lease program.[2] However, the discussion of these issues neglects the essential economics of the leasing decision. For example, he notes that the sales force training program "should include, above all else, a complete understanding of the user's position in deciding whether to rent or buy."[3] This is, in essence, the crux of a successful lease marketing program. An understanding of the lessee's decision process is crucial to the formulation of effective lease marketing strategies. Unfortunately, Bennett does not follow through on a detailed analysis of lessee decision procedures and their implications for lessors.

Indeed, few contemporary writers have been able to appreciate either the importance of leasing as an industrial marketing tool or the significance of the financial analysis techniques employed by lessees. Despite the growth of leasing, the field of marketing continues to be "transfer-of-title" oriented.[4] As an example, the authors of the two best-known models of industrial buyer behavior fail

---

(Homewood, IL: Richard D. Irwin, 1967), pp. 46-56; Gerald G. Cooney, The Management and Operation of a Bank Affiliated Leasing Company (Boston: Financial Publishing Company, 1971), pp. 23-31; and Leonard L. Berry and Kenneth E. Maricle, "Consumption Without Ownership: Marketing Opportunity for Today and Tomorrow," MSU Business Topics 21 (Spring 1973): 33-41.

[1]Peter D. Bennett, Marketing Aspects of Capital Equipment Leasing (Austin, TX: Bureau of Business Research, University of Texas, 1961).

[2]Ibid., pp. 50-53. [3]Ibid., p. 53.

[4]Berry and Maricle, p. 35.

to even mention leasing in the presentation of their approaches,[1] and the leading textbook in the field of industrial marketing devotes a total of three paragraphs to the subject.[2] General marketing texts are similarly superficial in their treatment of leases. The majority of leading textbooks give only passing mention to the subject, and the more recent editions of the two best-selling works have deleted all reference to leasing.[3] Contemporary writers have variously characterized the lease as a "pricing arrangement,"[4] an "acquisition service,"[5] a method for conserving capital,[6] and a device "to retain control over price."[7] Nowhere is there to be found a clear recognition of the lease as a financial device which provides the industrial consumer with

---

[1]Frederick E. Webster, Jr. and Yoram Wind, Organizational Buying Behavior (Englewood Cliffs, NJ: Prentice-Hall, 1972); and Jagdish N. Sheth, "A Model of Industrial Buyer Behavior," Journal of Marketing 37 (October 1973): 50-56.

[2]See, Richard M. Hill, Ralph S. Alexander, and James S. Cross, Industrial Marketing, 4th ed. (Homewood, IL: Richard D. Irwin, 1975), pp. 231-32. This is particularly significant given the estimate that by 1977 approximately 30 percent of all new capital equipment acquisitions will be made by lease. See, Vanderwicken, p. 136.

[3]E. Jerome McCarthy, Basic Marketing, 5th ed. (Homewood, IL: Richard D. Irwin, 1975), and Philip Kotler, Marketing Management, 2nd ed. (Englewood Cliffs, NJ: Prentice-Hall, 1972).

[4]Thomas A. Staudt and Donald A. Taylor, A Managerial Introduction to Marketing, 2nd ed. (Englewood Cliffs, NJ: Prentice-Hall, 1970), p. 514.

[5]William Lazer, Marketing Management (New York: John Wiley and Sons, 1971), p. 239.

[6]George Fisk, Marketing Systems (New York: Harper and Row, 1967), p. 343; and Kotler, 1st ed., p. 32.

[7]McCarthy, 4th ed., pp. 700-701.

a set of economic benefits.[1] Moreover, there is a lack of appreciation in the marketing literature for the importance of the lessee's analysis methodology in the lease-purchase decision process.

Purpose and Scope of the Research

It is clear that there are a number of significant areas in which the lease marketing literature is deficient. A genuine need exists for marketers to become familiar with the economic aspects of leasing. It is also imperative for firms engaged in leasing to determine the nature of the lessee's decision process and to identify the analytical techniques employed by lessees in making the lease versus purchase decision. Finally, the marketing implications of the lessee's decision procedure must be determined so that lessors may be able to improve the efficiency with which they are able to satisfy their customers' capital equipment needs.

With these considerations in mind, this study will focus on the following research questions:

1. What are the economic and noneconomic benefits of leasing from the standpoint of the lessee?

2. What is the nature of the lease versus purchase decision process of industrial organizations?

3. What models exist in the literature for the financial analysis of lease versus purchase decisions?

4. Which financial analysis methodologies are employed by large industrial firms to make lease versus purchase decisions?

---

[1]The economic benefits listed by Stanton and by Staudt and Taylor are somewhat questionable. See, William J. Stanton, Fundamentals of Marketing, 4th ed. (New York: McGraw-Hill Book Company, 1975), p. 155; and Staudt and Taylor, pp. 514-15. A detailed analysis of the economic and noneconomic benefits of leasing will be found in Chapter II.

5. What are the lease marketing implications of the decision procedures employed by industrial organizations?

Secondary sources will be employed in an attempt to answer a majority of the research questions. The empirical portion of the study focuses on question (4). A survey will be conducted among Fortune 200 firms to identify the analysis methodologies used by these corporations in making lease-purchase decisions. The survey design and methodology are detailed in Chapter IV. The existing literature on lease versus purchase decision models is reviewed in Chapter III. This chapter emphasizes the development of the current body of literature and attempts to compare and contrast the various analytical techniques. In Chapter II the proposed benefits of leasing are carefully examined and a descriptive model of the industrial lease-purchase decision process is offered. The analysis of the potential benefits of leasing draws on a broad spectrum of sources from the financial, economic, accounting, and tax literatures. The objective of this section is to critically review the various proposed benefits of leasing in an attempt to identify its true advantages. The model of the lease-purchase decision process builds upon the foundtions of the Sheth and Webster-Wind models of industrial buyer behavior.[1] Its purpose is to identify the important variables and interrelationships which impact the decision. In addition, the model serves as a guide to the formulation of lessor marketing strategies. Finally, in Chapter V the results of the survey are reviewed and the implications for lease marketing are discussed. The

---

[1]Sheth, pp. 50-56; and Webster and Wind.

recommendations for lessors are based upon the survey and upon a detailed review of the relevant literature.

The study emphasizes the financial aspects of the industrial leasing process. As such, it is limited to an examination of the "full-payout" or financial lease.[1] The major objective of the research is to identify the means by which lessors may improve their ability to market the economics of leasing. In this regard, the emphasis will be on the leasing of industrial equipment, although much of the discussion is also applicable to real property leases. The implications of the study apply to both manufacturer and nonmanufacturer lessors. It is felt that the marketing activities of both segments of the industry can benefit from a detailed appraisal of the economics of leases.

Limitations

The major limitations of the study concern the survey design and methodology. The survey consists of a nonprobability sample of large industrial corporations. Thus, generalizations to other populations are tenuous at best. In addition, the study focuses only on the financial aspects of the respondents' decision process. No attempt has been made to identify the qualitative elements which may impact the respondents' ultimate decision. Finally, it must be recognized that the survey design is subject to response bias on the part of the analysts completing the case problem and questionnaire.

---

[1]Operating leases are discussed briefly in Chapter II. The use of the term "lease" throughout the remainder of this dissertation is understood to refer to financial leases unless specifically qualified.

The artificiality of the task and the potential for evaluation apprehension may lead the analyst to respond in a manner which does not reflect his actual lease analysis procedure.

CHAPTER II

THE NATURE OF LEASE MARKETING

The Leasing Industry

The lease represents an ancient method of obtaining the services of assets. The earliest known references to leases appear in Hammurabi's Code.[1] It is also known that leases were employed during the Hellenistic and Roman eras as well as during the Middle Ages.[2] In the United States, leasing developed as an outgrowth of conditional sales contracts in the railroad industry. Kares reports that as early as 1839 a form of the conditional sales contract was employed when the Locks and Canals Company retained title to a number of locomotives it had built for the Baltimore and Susquehanna Railroad until the notes it accepted had been honored.[3] Throughout the remainder of the nineteenth century, leases and conditional sales contracts were used extensively in the transportation industry.[4] The manufacturers of shoe machinery and glassware machinery were other early adopters of the lease as a financing and marketing device.[5] It was not until after World War II,

---

[1]Morris Jastrow, Jr., The Civilization of Babylonia and Assyria (Philadelphia: J. B. Lippincott Co., 1915), p. 349.

[2]Peter Kares, "Some Economic Implications of Equipment Lease Financing" (Ph.D. dissertation, Purdue University, 1968), p. 13; and Stanley L. McMichael, Leases: Percentage, Short and Long Term, 4th ed. (Englewood Cliffs, NJ: Prentice-Hall, 1947), pp. 1-6.

[3]Kares, p. 14. [4]Ibid. [5]Babione, pp. 73-94.

however, that the financial lease became an important method of acquiring assets of all types. Prior to this time, leasing was largely confined to specific industries.[1]

The postwar growth of leasing coincided with the formation of the independent leasing companies during the early 1950s. The first independent, established in 1952, was the United States Leasing Corporation.[2] United States Leasing, along with firms such as Boothe Leasing Corporation, Hertz, Lease Plan International, and National Equipment Rental, experienced rapid growth during this period. At the same time, manufacturers such as IBM, Remington Rand, Pitney-Bowes, and the National Cash Register Company were expanding their use of leasing in the business equipment industry.[3] As a result, more firms in different industries were being exposed to the lease as a means of acquiring industrial equipment.

While reliable statistics on the volume of industrial leasing do not exist,[4] Brigham estimates that equipment leasing grew at a rate of 30 percent a year during the decade of the 1950s.[5] Estimates for 1973 place the original cost value of industrial equipment on lease between $60 and $75 billion.[6] It is estimated that this is growing at

---

[1]See, McNeill, pp. 416-17; and, Eiteman and Davisson, p. 17.

[2]Bennett, p. 19. [3]Ibid., pp. 11-23.

[4]The American Association of Equipment Lessors is currently conducting the first extensive survey of the industry. See, AAEL News Bulletin, 18 July 1975, p. 3.

[5]Brigham, "Impact of Bank Entry."

[6]Vanderwicken, p. 136; and, "Leases: A Hidden Debt," Business Week, 12 October 1974, p. 60.

an annual rate between 16 and 20 percent.[1] Vanderwicken notes that if the present growth rate in leasing continues, approximately one-fifth of all new capital equipment acquired in 1977 will be leased.[2]

There are approximately 1,800 to 1,900 financial institutions and subsidiaries of industrial firms involved in industrial leasing.[3] In addition, there is a growing, but unknown, number of manufacturers who offer their products for both sale and lease.[4] Participants in the leasing market may be grouped into four, somewhat overlapping, categories. These include manufacturer lessors, captive leasing or credit companies, independent leasing companies, and bank lessors. Each of these will be described in the following sections.[5]

Manufacturer lessors

The bulk of industrial leasing is done by manufacturing firms that lease their products.[6] Leasing still tends to be prominent in specific industries. The best-known example is the office and business equipment industry. Other industries in which leasing is important include: construction equipment, machine tools, materials handling equipment, petroleum refining equipment, telephone and telegraph

---

[1]Ibid. [2]Vanderwicken, p. 136.

[3]John T. Leatham, "No Letup in Leasing," Conference Board Record 11 (March 1974): 62; and, Vanderwicken, p. 136.

[4]Vanderwicken, p. 136.

[5]The following taxonomy draws heavily upon Vincent John McGugan, Competition and Adjustment in the Equipment Leasing Industry (Boston: Federal Reserve Bank of Boston, 1972), and Henry G. Hamel, Leasing in Industry (New York: National Industrial Conference Board, 1968).

[6]Leatham, p. 62.

machinery, and transportation equipment.[1] Manufacturers have found that leasing adds a new dimension to their marketing efforts. In many instances, manufacturer lessors are able to offer unique benefits through lease transactions which are not available from other types of lessors. For example, manufacturers may be able to provide the lessee with repair, maintenance, and management services at a lower effective cost than other types of leasing institutions. Similarly, the manufacturer's expertise with regard to the secondary market for the equipment may allow him to realize a higher residual value at the termination of the lease. This advantage may, in turn, be passed on to the lessee via a lower lease rate. Each of these potential advantages will be elaborated upon in a later section of the chapter.

Captive leasing or credit companies

A number of manufacturers have established special leasing subsidiaries referred to as "captives" or finance companies. The most important function of the captive is to obtain the outside financing necessary to support the leasing activities of the parent concern. Depending upon the nature of the industry and the parent's volume of leases, the captive may work very closely with the parent company or may operate much like an independent leasing company.[2] The former arrangement is the most common and simply represents an alternative organizational structure for the leasing activities of manufacturers.

---

[1]Bennett, p. 16. [2]McGugan, pp. 35-36.

Independent leasing companies

Hamel identifies three basic types of independent leasing companies: (1) the financial leasing company, (2) the specialized leasing company or service organization, and (3) the lease broker.[1] The first is, in essence, a financial intermediary which leases all types of capital assets. The specialized leasing firm concentrates on specific types of assets and provides other services in addition to financing. In contrast, the lease broker provides no financing services and is primarily concerned with arranging transactions between lessees and lessors. It should be noted that these categories are not mutually exclusive. It is not uncommon, for example, to find large independents acting in all three capacities.

Financial leasing companies. The financial leasing company acts very much like a financial intermediary. Its primary function is the provision of funds to facilitate the acquisition of capital assets. Typically, the lessor purchases the asset at the lessee's direction and has it delivered without actually handling the equipment. In general, financial lessors are highly leveraged. The smaller firms will frequently finance each lease as a separate transaction. In contrast, the larger companies will usually obtain their financing in large blocks from banks, insurance companies, pension trusts, and institutional investors.[2] The debt financing is normally secured by a pledge of the lease payments and by the leased assets themselves.[3]

---

[1]Hamel, pp. 16-20. [2]Ibid., p. 18. [3]McGugan, p. 30.

Specialized leasing companies. Specialized lessors provide various nonfinancial services in addition to basic lease financing. These firms tend to concentrate on the leasing of automotive, office, and industrial equipment.[1] The services provided by the specialized leasing companies include the disposal of used equipment, maintenance and service of leased equipment, the provision of insurance coverage, and the payment of taxes and license fees.[2] This is in contrast to financial leasing companies which generally provide no auxiliary services beyond the financing of the acquisition. Specialized lessors will also lease equipment for shorter time periods than financial leasing firms and will offer leases which are cancellable.

Lease brokers. The basic function performed by the lease broker is to bring together the parties to a lease transaction. Typically, this will involve a firm in need of capital equipment, the manufacturer of the equipment, and a financial intermediary or group of intermediaries. In small or medium-size transactions, only a single financial institution, typically a bank, will be involved. In large transactions, it may be necessary to form a consortium of banks and insurance companies to provide the financing.[3] The broker, who is also called a packager, provides facilitating services and is generally compensated on a fee basis.

---

[1] Hamel, p. 16.

[2] McGugan, p. 32. Other services may also be provided, depending upon the industry and the specifics of the situation.

[3] Vanderwicken, pp. 132-36.

Bank leasing

Banks may participate in the leasing market either as direct lessors or as the suppliers of funds for direct lessors. Commercial banks have always been major suppliers of funds to the leasing industry. In the last 10 years, however, bankers have expanded their traditional role of indirect participation and have moved heavily into direct leasing. Banks which operate their own leasing departments or subsidiaries take title to the leased equipment and deal directly with the lessee. Indirect participants deal with nonbank leasing institutions and provide them with financing on a short- and intermediate-term basis.

Direct lease financing. In 1963 the Comptroller of the Currency ruled that "direct lease transactions . . . constitute legal and proper activities for National Banks."[1] Shortly thereafter, various states promulgated similar rulings to allow state chartered banks to enter the direct leasing field.[2] The initial reaction among national banks was cautious. By December of 1964, only 81 national banks were involved in direct leasing.[3] This has since grown to 655 as of October, 1974.[4] In addition, the volume of direct lease financing by national banks rose by more than $1 billion to $2.37 billion during the 12-month period

---

[1]U.S., Comptroller of the Currency, Annual Report, 1963 (1963), p. 476.

[2]Eugene F. Brigham, "Equipment Lease Financing," The Banker's Magazine 149 (Winter 1966): 65-66.

[3]Cooney, p. 13. [4]AAEL News Bulletin, 16 June 1975, p. 10.

ending October 15, 1974.[1] By comparison, the amount of direct lease financing by state banks remains small.[2]

Direct bank lessors operate in a fashion which is similar to financial leasing companies. Most banks contract with the customer to purchase the specified asset and secure delivery to the customer's place of business without taking physical possession of the equipment. The majority of bank leases are of the full-payout variety. That is, the lease payments over the basic term of the lease exceed the purchase price of the asset, and the lessee assumes all of the ancillary costs and liabilities associated with the use of the equipment.[3] Banks view the lease as a debt-equivalent and their role as that of providing the funds necessary to acquire the use of the asset. The apparent reason for the entry of large numbers of national banks into the leasing field is their desire to supplement their lending activities and the need "to offer as complete a financial service as possible."[4]

Indirect lease financing. Banks participate in the leasing market indirectly by providing funds to various types of lessors. Banks may lend to manufacturer lessors, independents, or captive leasing companies. Frequently, banks will establish informal working relationships with a number of independent leasing firms or manufacturer lessors.[5] In some cases, banks reserve the right to review the credit standing of potential lessees. The leased equipment serves as the collateral for these loans. In addition, the lessor generally assigns

---

[1]Ibid. [2]Cooney, pp. 13-14. [3]McGugan, p. 37. [4]Hamel, p. 26.
[5]Ibid., pp. 22-25.

the lease payments to the bank. Such assignment is considered the major security for the loan.[1]

Leases Defined

Various definitions of leasing are possible. Much depends upon one's viewpoint and the purpose of the definition. Moreover, the various viewpoints and the resultant definitions are somewhat interrelated. For example, Webster's Third New International Dictionary gives the following definition of a lease: "A contract by which one conveys lands, tenements or hereditaments for life, for a term of years, or at will or any less interest than that of the lessor, usually for a specified rent or compensation."[2] From a legal standpoint, the contract created by a lease transaction is generally considered to be executory in nature.[3] Black defines executory as "that which is yet to be executed or performed; that which remains to be carried into operation or effect; incomplete; depending upon a future performance or event. The opposite of executed."[4] In contrast, an executed contract is one which has already been carried out and is complete in all respects.[5] It

---

[1]Ibid., p. 22.

[2]Webster's Third New International Dictionary (1971), s.v. "Lease."

[3]Mary M. Wehle, "Lessee Decision Criteria and Accounting Implications" (Ph.D. dissertation, Harvard University, 1972), p. II-7. Wehle notes, however, that "there is no single opinion as to whether a lease is an executed or executory contract. Rather the law is a patchwork of case decisions on which assumptions may be built. Case law and judicial decisions bear on the issue, but do not provide complete, unassailable answers."

[4]Black, Law Dictionary 680 (rev. 4th ed. 1968).

[5]Ibid., p. 676.

is this view of a lease as an executory contract which is the major justification for the Accounting Principles Board opinion that "disclosure rather than capitalization is the correct accounting treatment," for most types of leases.[1] Since both sides of an executory contract are equally unperformed, the board does not consider lease obligations to be assets or liabilities under present accounting concepts.[2]

From the standpoint of the practitioner, however, the more important view of the lease may be that of the Internal Revenue Service. Under Section 162(a)(3) of the Internal Revenue Code, lease obligations are an allowable deduction as trade or business expenses.[3] However, for lease payments to qualify as a deduction, the lease must meet the IRS "true" lease requirements. If it does not, the transaction is viewed as a conditional sale, and the payor may only deduct the allowable depreciation on the asset.[4] Thus, a potential tax advantage may result because of the differential timing of lease and depreciation deductions. The purpose of the IRS requirements is to prevent a firm from realizing a tax advantage by treating a conditional sale as a lease transaction. While the IRS warns that "no general rule, applicable to all cases, can be laid down,"[5] a transaction may be viewed as a sale rather than a lease if one or more of the following conditions exist:

---

[1] APB Accounting Principles (New York: Commerce Clearing House, 1973), p. 6524; and Earl A. Spiller, jr., Financial Accounting, rev. ed. (Homewood, IL: Richard D. Irwin, 1971), p. 374.

[2] Ibid. [3] 2 P-H 1975 Federal Taxes, par. 11,005.

[4] P-H Federal Tax Course 1975, par. 1841 (1975).

[5] Rev. Rul. 55-540, 1955 CB 41.

1. Portions of the periodic payments are made specifically applicable to an equity to be acquired by the lessee.

2. The lessee will acquire title upon the payment of a stated amount of "rentals" which under the contract he is required to make.

3. The total amount which the lessee is required to pay for a relatively short period of use constitutes an inordinately large portion of the total sum required to be paid to secure the transfer of title.

4. The agreed "rental" payments materially exceed the current fair rental value.

5. The property may be acquired under a purchase option at a price which is nominal in relation to the value of the property at the time when the option may be exercised, as determined at the time of entering into the original agreement, or which is a relatively small amount when compared with the total payments which are required to be made.

6. Some portion of the periodic payments is specifically designated as interest or is otherwise readily recognizable as the equivalent of interest.[1]

As a result of these requirements, lessors will generally seek advance rulings from the IRS on the status of large lease transactions.[2]

Types of Leases

Leases may be grouped into two broad categories: financial leases and operating leases. There are, however, a number of varieties within each category, as well as hybrid types which are not easily classified. In the following sections, the general characteristics of

---

[1] Ibid., pp. 41-42. These represent the published criteria. In practice, the IRS employs various additional guidelines. See, McGugan, p. 25, and Rev. Proc. 75-21, IBR 1975-18, 15.

[2] McGugan, p. 25.

the more important types of leases within each category will be discussed.[1]

Financial leases

The financial lease is typically a long- or intermediate-term, noncancellable lease which is fully amortized over its basic term (that is, the sum of the lease payments will equal or exceed the original purchase price of the equipment). In a "net" financial lease, the payments exceed the purchase price over the term of the contract and "the lessee pays all property taxes, sales taxes, use taxes, fees, maintenance, insurance, etc., and assumes all liabilities connected with the use of the property."[2] Under competitive pressures, however, the lessor may agree to pay a portion of the asset's operating costs.

Financial leases generally include a purchase option which the lessee may exercise at the termination of the contract. Great care is taken in writing purchase options in order to meet the IRS "true" lease requirements. In most cases, the contract will stipulate the fair market value of the equipment at the end of the lease as the purchase price and will specify the method to be used to determine that value.[3] Financial leases are most often written by financial leasing companies and banks. In addition, many manufacturers and captives write leases which have many of the characteristics of financial leases.[4]

---

[1]The following sections owe much to discussions with executives and members of the American Association of Equipment Lessors.

[2]McGugan, p. 22. [3]Ibid., p. 23.

[4]Most of these leases are noncancellable, full-payout leases. However, they frequently differ from the financial leases written by independents or banks with regard to services provided and the nature of the purchase or lease renewal options.

Leveraged leases. Leveraged leases are a special case of financial leases. In this instance, the lessor borrows a portion of the asset's cost from a third party. The lessor generally gives the third party a mortgage on the leased asset and an assignment of the lease payments as security.[1] In large leveraged lease transactions, a group of banks will typically act as lessors. They may borrow up to 80 percent of the asset's cost from institutional lenders such as insurance companies.[2] In return, the insurance companies will receive most of the lease payments as interest and reduction of principal on the debt. The bank-lessors receive the remaining portion of the lease payments and, as owners of the asset, all of the tax benefits. The tax benefits include the tax shields from accelerated depreciation and interest payments on the debt as well as the investment tax credit. In addition, the banks realize the residual value of the equipment at the end of the lease.[3]

The ability of firms with low or heavily sheltered earnings to pass on the tax benefits of leasing to bank-lessors is one of the most powerful attractions of the leveraged lease. From the standpoint of the bank, the major attraction is the ability to earn high returns through the use of leverage. In fact, the combination of tax benefits and

---

[1]McGugan, p. 24.

[2]The IRS requires a lessor to maintain a 20 percent equity in the equipment in leveraged lease transactions. See, Rev. Proc. 75-21, IBR 1975-18, 15.

[3]Vanderwicken, pp. 132-36.

leverage will frequently allow the lessor to charge an implicit interest rate which is below the lessee's cost of debt financing.[1]

Leveraged lease transactions are frequently arranged by a lease broker. The major function of the broker is to put together the consortium of financial institutions and assist in the negotiations of the lease terms. In very large transactions, more than one broker may be involved. For example, a financial leasing company may arrange the participation of the banks and an investment banker may arrange for the insurance company participation.[2]

Sale and leaseback. The sale and leaseback arrangement is another special case of the financial lease. In this type of transaction a firm sells an asset to a financial institution and immediately leases it back under a financial lease.[3] The effect is the same as if the lessor had purchased the asset from a third party and leased it to the firm.

A company may benefit from a sale and leaseback if, for some reason, its tax status changes and it is not able to employ the depreciation-generated tax shields associated with the asset. Firms may also use the sale and leaseback as a means of obtaining funds. It is possible that the sale and leaseback of a capital asset may result

---

[1]Ibid., p. 192. Vanderwicken reports that it is even possible for the lessee to obtain the asset at a negative interest cost, i.e., the total lease payments over the term of the lease are less than the purchase price of the equipment.

[2]Ibid., pp. 132-36.

[3]J. Fred Weston and Eugene F. Brigham, Managerial Finance, 5th ed. (Hinsdale, IL: Dryden Press, 1975), p. 476.

in a lower net cost of financing than the issuance of a debt instrument. This might result from the preferred security position of a lessor vis-á-vis a debt holder.[1]

Operating leases

Operating leases are generally short-term, cancellable contracts under which the lessor assumes most or all of the responsibilities of ownership. Operating leases are not fully amortized over their basic terms. This type of lease provides the lessee with flexibility in that equipment may be leased which is needed only for short periods of time. However, the rates may be relatively high in order to compensate the lessor for assuming the operating costs and the risks of obsolescence. Operating leases are most frequently written by manufacturers and specialized leasing companies and are prominent in the areas of automotive, office, and industrial equipment.[2]

The Potential Benefits of Leasing

From a marketing standpoint, a lease may be viewed as a package of economic and noneconomic benefits. A lease is not merely an alternative means of paying for an asset's services. It has the potential of offering benefits which go far beyond the provision of use value. Chief among these benefits are the potential economic advantages of leasing. (The ability to pay for an asset's services over an

---

[1]Timothy J. Nantell, "Lessor's Pricing Decision, An Indifference Theorem, and the Evaluation of Lease vs. Buy Algorithms" (unpublished paper, University of Michigan, 1975), p. 14.

[2]Weston and Brigham, 5th ed., pp. 476-77; and McGugan, pp. 27-28.

extended period of time is not a unique advantage of leasing, since the same result may be achieved via debt financing of a purchase.) In the following section, seven "true" economic advantages of leasing will be discussed. In the next section, a number of economic "advantages" of a more dubious nature will be examined. Finally, some of the alleged noneconomic benefits of leasing will be covered and empirical evidence on the advantages which firms seek to obtain from leases will be presented.

Potential economic advantages of leasing

Nantell has identified seven potential economic advantages of leasing.[1] The first recognizes the fact that the lessor may be able to obtain the asset at a lower effective cost than the lessee and may be willing to pass on all or a portion of the savings in a lower lease rate. This may be the result of quantity discounts or it could result from a tax benefit which the lessor can take advantage of but the lessee is unable to utilize.[2]

An excellent example of the latter advantage is the investment tax credit. Firms with low or heavily sheltered earnings may be unable to use the full amount of the applicable investment credit if they purchase an asset.[3] On the other hand, a lessor may be able to utilize the full amount of the credit and pass on a portion of the savings to the lessee via a lower rental rate. Banks are in a particularly

---

[1]Nantell, "Lessor's Pricing," pp. 12-15. [2]Ibid., p. 12.

[3]For the regulations relating to the use of the investment tax credit, see, P-H Federal Tax Course 1975, par. 2050 (1975).

favorable position to write tax-oriented leases since, in general, they do not face restrictions on the use of the investment tax credit.[1] Similarly, independent lessors which are subsidiaries of larger corporations are able to use the credit to reduce the tax obligations of their parent firms. In addition to the investment credit "pass-through," lessees with large loss carry-forwards may be able to benefit by allowing the lessor to take the accelerated depreciation and interest tax shields associated with the capital outlay.[2] Vanderwicken provides an example of a firm with a 10-year multimillion dollar loss carry-forward which was able to lease a plant at a considerable savings via a tax-oriented leveraged lease.[3]

A second economic advantage of leasing may result if the lessor incurs a portion of the asset's operating costs. It is possible that the operating costs to the lessor may be less than those which would have to be incurred by the lessee. For example, the lessor may be able to attain economies of scale in the provision of repair, maintenance, and management services for a particular type of equipment or a specific group of lessees.[4]

A third possible advantage may result if the lessor is able to depreciate the asset over a shorter time period than the lessee. The

---

[1]McGugan, p. 40. Most large banks have sufficiently high earnings and sufficiently low capital expenditure programs to employ the full amount of the credit on the leases they write.

[2]An interest tax shield would be available to the extent that the acquisition is wholly or partially financed with debt.

[3]Vanderwicken, pp. 132-36.

[4]McGugan, p. 32; and Weston and Brigham, 5th ed., p. 482.

larger depreciation expenditures of the lessor will result in greater tax savings which may be passed on in a lower rental cost. This might result if the lessor uses the lease term as the estimated useful life of the asset while the lessee employs the Class Life Asset Depreciation Range option.[1] To the extent that the lease term is less than the Asset Depreciation Range (ADR), an economic benefit may result. It is unlikely, however, that a significant advantage could be generated from the use of differential depreciation lives. In most instances, the useful economic life and the ADR life will be very close, and any attempt by the lessor to write the asset off over a period which is substantially less than its useful economic life could be disallowed by the IRS.[2]

Another tax-related advantage to leasing may occur if the tax rate of the lessor is less than that of the lessee. To the extent that these savings are passed on to the lessee, a fourth advantage of leasing has been identified.

Thus far, the advantages of leasing which have been discussed have resulted from cash flow savings available to the lessor but not to the lessee. Another set of benefits may result from differential expectations as between the lessor and lessee. For example, in determining his lease rate, the lessor may anticipate a higher salvage

---

[1]Under the Class Life ADR system, firms are allowed to choose a range of depreciation lives for each type of asset owned by the firm. The Asset Depreciation Ranges are determined by the IRS. Once a firm has elected to use the Class Life ADR system for a particular type of equipment, all assets falling within the Guideline class must be depreciated under the ADR system during the year of the election. See, P-H Federal Tax Course 1975, par. 2032-2034 (1975).

[2]Ibid., par. 2002 and 2032.

value than the lessee. In particular, manufacturer lessors and their captives may be uniquely situated to take advantage of their specialized knowledge of the leased equipment. In addition to their superior ability to forecast the secondary market for the equipment, they may be able to realize economies of scale in the reconditioning and sale of the asset once it comes off lease.[1] Indeed, these firms may actually be able to stretch the useful economic life of a piece of equipment through a combination of expert maintenance and marketing.[2]

A related advantage can occur if the lessor perceives less risk in the operating expense and salvage value cash flows than the lessee. This may lead the lessor to discount these flows at a lower rate in determining the lease charge. Thus, the economic advantage is passed on in a lower rental rate. Again, manufacturer lessors and captives, as well as specialized leasing companies, would be in the best position to capitalize on this potential benefit. Indeed, financial institutions, which do not have specialized knowledge of the equipment and do not have the capability of realizing economies in its reconditioning and disposal, may actually perceive greater risk in these cash flows.[3] As a result, banks and financial leasing companies would tend to be at a competitive disadvantage with regard to this potential benefit of leasing.

---

[1]Weston and Brigham, 5th ed., p. 483; and McGugan, pp. 32-33.

[2]A case in point is the Clark Equipment Company. See, Weston and Brigham, 5th ed., p. 483.

[3]Many banks, for example, assume a zero salvage value in pricing their leases as a matter of policy.

A final economic advantage may exist if the lessor demands a lower rate of return than would be required by a lender. This might be the result of a competitive strategy on the part of a lessor. For example, the lessor may be attempting to carve out a share of a new market by underpricing the existing competitors. It may also result because "the lessor views his security position as superior to that of a lender since he retains title to the asset."[1] Furthermore, if the lessee defaults on a personal property lease, the lessor is entitled to "damages"--defined as the present value of the difference between the unpaid lease rentals and the lease payments the lessor can obtain upon re-leasing the asset.[2]

Questionable economic advantages of leasing

Through the years, various writers have constructed long lists of the economic benefits of leasing.[3] Unfortunately, some of these proposed benefits do not hold up under close scrutiny. It is the intention of this section to examine several of the more persistent of the alleged advantages.[4]

---

[1]Nantell, "Lessor's Pricing," p. 14. [2]McGugan, p. 23.

[3]See, for example, McNeill, pp. 422-25; Mark Levy, "The Trend of Corporations to Sell Their Real Estate to Institutional Investors," The Mortgage Banker 8 (November 1947): 11-16, and (December 1947): 2-7; and Frank K. Griesinger, "Pros and Cons of Leasing Equipment," Harvard Business Review 33 (March-April 1955), reprinted in Leasing Series (Boston: Harvard Business Review, n.d.), pp. 49-63.

[4]A somewhat more detailed listing of the proposed benefits of leasing will be found in Andrew T. Nelson, "The Impact of Leases on Financial Analysis" (Ph.D. dissertation, Michigan State University, 1962), pp. 14-38.

One of the best known and most widely debated arguments for leasing is that it provides the firm with "off balance sheet financing." Under Accounting Principles Board Opinions 5 and 31, most leases do not have to be capitalized as liabilities on the lessee's balance sheet.[1] Firms need only disclose the presence of leases via footnotes to the audited financial statements.[2] The omission of lease commitments from the balance sheet has a favorable, and deceptive, effect on various financial ratios.[3] The alleged advantages of this financial ratio improvement are twofold. First, if creditors do not fully appreciate the implications of a firm's lease commitments, they may perceive less risk in granting loans to the company. As a result, the lessee's ability to raise additional debt capital may be enhanced, and the firm may be able to obtain the funds at a lower rate.[4] Second, if equity investors do not perceive the same amount of risk with lease commitments as they do with an equivalent amount of debt financing, they may require a lower return on equity for a lessee firm. The result is a lower implicit cost of lease financing.[5]

---

[1] APB Principles, pp. 6521-26 and 6817-21.

[2] The Financial Accounting Standards Board has recently issued the long-awaited draft of its proposed requirements for lease accounting. Based on the proposed criteria for capitalization, it appears that the changes will be minimal. See, "Accounting for Leases," Executive News Briefs 3 (September 1975): 1-2.

[3] Nelson, pp. 135-41.

[4] James C. Van Horne, Financial Management and Policy, 3rd ed. (Englewood Cliffs, NJ: Prentice-Hall, 1974), p. 582.

[5] Ibid.

It is unlikely, however, that debt and equity investors are seriously misled by the accounting treatment of leases.[1] There is a good deal of sophistication in the financial community with regard to leasing, and it is improbable that many financial analysts are fooled by the off balance sheet nature of leases.[2] Indeed, the leasing industry itself cautions that financial institutions take a firm's lease obligations into account in determining its credit worthiness.[3] What is more, the empirical evidence on market efficiency generally supports the position that changes in accounting procedures do not affect the decisions of investors. In other words, investors are able to "see through the numbers" and assess the intrinsic value of securities.[4]

---

[1]One of the earliest arguments to this effect was made by Donald R. Gant, "Illusion in Lease Financing," Harvard Business Review 37 (March-April 1959), reprinted in Leasing Series (Boston: Harvard Business Review, n.d.), pp. 1-22.

[2]A 1959 survey by Vancil and Anthony found that financial institutions were well aware of the implications of leases but that few used formal analytical techniques to transform lease commitments to debt equivalents. See, Richard F. Vancil and Robert N. Anthony, "The Financial Community Looks at Leasing," Harvard Business Review 37 (November-December 1959), reprinted in Leasing Series (Boston: Harvard Business Review, n.d.), pp. 31-48.

[3]Leonard Rochwarger, "The Flexible World of Leasing," Fortune 89 (November 1974), pp. 56-59 (advertisement). It should be noted, however, that many lessors still include off balance sheet financing as an advantage in their promotional brochures.

[4]An excellent review of the empirical evidence on market efficiency will be found in James H. Lorie and Mary T. Hamilton, The Stock Market (Homewood, IL: Richard D. Irwin, 1973), pp. 70-97; and Baruch Lev, Financial Statement Analysis (Englewood Cliffs, NJ: Prentice-Hall, 1974), pp. 212-23. The major studies on the effect of accounting changes on security prices are reviewed in Lev, pp. 235-44.

One of the oldest arguments in favor of leasing is that it provides the firm with 100 percent financing.[1] This is frequently referred to as the "conservation of working capital" advantage. It is reasoned that since a lease does not require a down payment or initial equity investment, the firm is able to "conserve" cash or working capital. The underlying assumption is that funds invested in high-turnover working capital "earn" more than if they are invested in low-turnover fixed assets.

Unfortunately, there are serious flaws in this line of reasoning. It is doubtful that a lease allows a firm to conserve cash vis-á-vis debt financing. In line with the previous discussion, it is reasonable to conclude that investors consider lease and debt financing to be equivalent. As such, a firm "would use up less of its capacity to raise nonequity funds with debt than it would with leasing."[2] It could, therefore, issue an alternative debt instrument to make up the difference. Thus, both debt and lease financing "conserve" similar amounts of working capital.

On the other hand, it is clear that a lease requires a lower initial outlay than a cash purchase.[3] Nevertheless, any benefit which accrues to the lessee is the result of deferring the lease payments and not from investing the funds in high-turnover working capital. As Johnson points out, it is meaningless to talk about current assets

---

[1]See, for example, McNeill, p. 422; and Eiteman and Davisson, pp. 73-75.

[2]Van Horne, 3rd ed., p. 579.

[3]Here it is assumed that the asset is purchased with cash which would otherwise be retained in the business.

"earning" more than fixed assets.[1] A firm requires a given mixture of both fixed and current assets to operate at its chosen capacity level. The relevant question is not how much cash is "released" with alternative financing methods, but, rather, which method raises shareholder wealth by the greatest amount.[2] This may be determined by discounting the alternative cash flows at the appropriate risk adjusted rates.[3] To the extent that there is an advantage to deferring lease payments, it will be reflected by the discounting mechanism.

It is sometimes argued that leasing offers an advantage in that the tax shield generated by the lease payments exceeds the tax shields from depreciation and interest which would be available if the asset were purchased with debt capital. However, the argument does not consider the possibility that the higher fixed commitments associated with the lease may cause shareholders to perceive greater risk in the firm. Assuming that the firm has an optimal capital structure,[4] the higher lease charges may cause investors to raise the firm's equity capitalization rate. In some instances, the higher capitalization rate may be sufficient to nullify the tax benefits of the lease.

Another proposed benefit of leasing is the argument that a lease allows a firm to amortize the cost of any land which is included in the

---

[1]Robert W. Johnson, Financial Management, 3rd ed. (Boston: Allyn and Bacon, 1966), pp. 533-34.

[2]Lawrence D. Schall, "The Lease-or-Buy and Asset Acquisition Decisions," Journal of Finance 29 (September 1974): 1203.

[3]This subject will be take up in great detail in Chapter III.

[4]Modigliani and Miller notwithstanding, in a world of taxes and bankruptcy costs it appears reasonable to assume that an optimal capital structure exists. See, Van Horne, 3rd. ed., pp. 237-43.

rental payments.[1] If the firm were to purchase the land, it would not be able to depreciate it for tax purposes. However, since lease payments are tax deductible, the lessee is able to write off the original cost of the land. Counteracting this advantage is the fact that the residual value of the property at the end of the lease term reverts to the lessor. Given the general trend in real estate prices, it is possible that the sale price of the land will offset the lessee's tax advantage.[2]

One final argument for leasing will be considered. It is said that firms with poor credit ratings are able to obtain assets through leases when they are unable to acquire debt capital. However, if investors view lease and debt commitments as equivalent, the lessee may be paying a high implicit cost because of an increase in the firm's equity-capitalization rate. In addition, the firm will most certainly face a high lease rate in order to compensate the lessor for bearing the risk of default. These higher costs may be sufficient to reduce the return on the leased asset below the required return for its risk class.

Operating advantages of leasing

As in the case of the potential economic advantages of leases, long lists of the noneconomic or operating advantages of leasing have been compiled. In this section, some of the more frequently cited operating advantages will be examined.

---

[1] Ibid., p. 580.

[2] This assumes, of course, that we are comparing discounted values.

Various potential advantages are included under the rubric of flexibility and convenience. It is argued that leasing provides the firm with flexibility because it allows for piecemeal financing of relatively small asset acquisitions. It is pointed out that debt financing of such acquisitions can be costly and difficult to arrange.[1] Leases, on the other hand, may be arranged more quickly and with less documentation.

A closely related advantage is that leasing may allow a division or subsidiary manager to acquire equipment without approval of the corporate capital budgeting committee. Depending upon the firm, the manager may be able to avoid the time-consuming process of preparing and presenting a formal acquisition proposal. It is argued that the greater flexibility this affords the executive constitutes a prime motivation for leasing.

A third advantage which relates to flexibility is that lease payment schedules may be structured to coincide with the revenues generated by the asset, or they may be timed to match seasonal fluctuations in a given industry. Thus, the firm is able to synchronize its lease payments with its cash cycle--an option which is rarely available with debt financing.

The convenience aspect of leasing may take many forms. It is argued, for example, that leasing simplifies bookkeeping for tax purposes because it eliminates the need to prepare time-consuming depreciation schedules and subsidiary fixed asset schedules.[2] In addition, the fixed payment nature of lease rentals allows more accurate

---

[1]Van Horne, 3rd ed., p. 578. [2]Nelson, p. 16.

forecasting of cash needs. Finally, it is frequently pointed out that leasing allows the firm to avoid the "problems" associated with ownership. Executives often note that leasing "keeps the company out of the real estate business." Implicit in this statement is the assumption that the firm's human and material resources may be more profitably allocated to its primary line of business and that it is better to allow the lessor to deal with the nuances associated with ownership.

It is difficult to generalize with regard to the validity of the various arguments for greater flexibility and convenience in leasing. To be sure, some companies, under specific conditions, may find leasing advantageous for any one of the reasons listed above. It is likely that the cost-benefit trade-offs will be different for every firm.

With regard to most of the advantages which were cited, the relevant concept is that of function shifting. By leasing a piece of capital equipment, a firm has effectively shifted various functions to the lessor (bookkeeping, disposal of used equipment, etc.). The lessee will only benefit in these situations if, (1) the lessor is able to perform the functions at a lower cost than the lessee, and (2) the lessor is then willing to pass the savings on in a lower lease rate. Thus, we return to a variant of Nantell's second economic advantage of leasing. To the extent that the lessor faces lower operating and/or administrative costs than the lessee, a true economic advantage to leasing may result. As a practical matter, however, it would be very difficult for a firm to quantify the potential convenience and flexibility benefits that it might derive from leasing.

Another highly touted advantage of leasing is its lack of restrictions. Unlike term loan agreements or bond indentures, lease contracts generally do not contain protective-covenant restrictions. Furthermore, it is sometimes possible to exclude lease payments from the firm's debt commitments in calculating various financial ratios under existing covenants. Once again, the extent to which the lack of restrictions benefits a firm will depend on the price it must pay. If a lessor views its basic security position to be superior to that of a creditor, it may not require a higher return to compensate it for the lack of restrictions on the lessee. On the other hand, if the prospective lessee is viewed as a marginal credit risk, a higher rate may have to be charged.

Similar reasoning applies to two other alleged operating advantages of leasing. It is argued that a lease is advantageous because the risk of obsolescence is avoided and because the lessor will provide the firm with better and more reliable service in order to maintain the resale value of the asset. In actuality, the risk of obsolescence is passed on to the lessee in any financial lease. Since the original cost of the asset is fully amortized over the basic lease term, all of the risk is borne by the lessee. In an operating lease, on the other hand, the lessor sets his rates to cover the risk of early obsolescence. Thus, the risk is once again passed on.

With regard to the quality of service under a lease contract, much will depend on the lessor's own cost-benefit trade-off. If the lessor is a manufacturer or specialized leasing company, it may be profitable to maintain the resale value of the asset by insuring that

the equipment is properly repaired and maintained. A financial leasing company, on the other hand, would probably find it too expensive to follow this approach. Thus, it is difficult to generalize with regard to this potential advantage.

In summary, it may be seen that many of the so-called noneconomic or operating advantages of leasing reduce to economic considerations. To the extent that the lessor realizes economies of scale in the performance of various functions, the lessee may benefit by shifting these functions to the lessor. A benefit may accrue if the "price" the lessor charges for performing these functions is below the lessee's cost. These trade-off relationships are likely to be situation-specific and may be difficult to quantify in actual practice.

Advantages of leasing as perceived by lessees

In the preceding sections, many of the proposed benefits of leasing were discussed. Seven "true" potential economic advantages were identified and a number of other economic and "noneconomic" advantages were critically reviewed. In this section, the benefits which firms perceive in lease transactions will be considered.

The data are derived from a 1972 study by Wehle and are based on interviews with top executives of 24 companies and mail questionnaires received from 30 firms.[1] The companies included in the interview data are of varying sizes and represent such industries as airlines, petroleum, retail trade, manufacturing, and service. The questionnaire respondents are all national and multinational corporations. The

---

[1]Wehle, pp. V-1 to V-32.

research objective was to identify the specific benefits which firms seek when entering lease transactions.

Wehle's major conclusion is that a firm's motivation for leasing is a function of many factors, including "the industry, the form and conditions of the lease, the firm's competitive position and the asset leased."[1] She also found that the most important consideration in the decision varies for different assets and at different times for the same firm. Thus, the leasing decision appears to be a dynamic process in which the "evaluative criteria" are very much situation specific.

Nevertheless, the responses to the questionnaire allow some generalizations with regard to the more significant advantages as perceived by the lessees. Wehle asked the respondents to consider four categories of potential benefits: (1) operating, (2) funds flow, (3) financial ratio, and (4) tax. The data indicate that operating considerations are the most salient for the firms surveyed.[2] Within this category, the following advantages were considered to be significant reasons for entering into financial leases:[3]

1. Leasing avoids the problems of disposing of second-hand equipment.
2. Leasing can be tailored to the lessee's needs more easily than ordinary purchasing.
3. Leasing will ensure the proper installation and functioning of equipment.
4. Property is leased because the purchase price is set at a higher level to encourage leasing.

---

[1] Ibid., p. VI-54. [2] Ibid.

[3] Only data relating to financial leases will be presented in this section. For the results relating to operating leases, see, ibid., pp. VI-43 to VI-46.

5. Property is leased because it is not available for purchase.[1]

The funds flow considerations which were considered to be important include:

1. Leasing provides 100 percent financing.
2. Leasing frees working capital for other uses.
3. Leasing is cheaper on a net basis than a similar amount of debt.
4. Debt covenants restrict further borrowing but do not prohibit leasing.
5. Leasing enables corporations to obtain the use of more assets than it would have if it relied on purchasing alone.
6. Leasing leaves normal lines of credit undisturbed.
7. Leasing avoids the restrictions found in loan agreements.[2]

The interview and questionnaire data indicate that financial ratio considerations are less significant in the leasing decision than is generally believed. Wehle concludes that many firms believe sophisticated investors are not fooled by the off balance sheet accounting treatment of leases. However, some firms suggest that this may be an advantage in dealing with "smaller stockholders and less sophisticated statement users."[3] As a result, the following two financial ratio considerations were viewed as significant by the respondent firms:

1. Leasing does not appear as a liability on the lessee's balance sheet.
2. Leases are not included in debt-equity ratios.[4]

---

[1]Ibid., p. VI-45. [2]Ibid., p. VI-43. [3]Ibid., p. VI-56.

[4]Ibid., p. VI-44.

Similarly, the study indicated that tax advantages were not a major factor in the leasing decision. Only three tax-related benefits were considered to be important:

1. The tax deductibility of leasing costs results in more immediate cash flow.
2. Leasing provides 100 percent deductibility of costs.
3. Property taxes are not levied on leased property in many states in which the company operates.[1]

On the basis of the interview and questionnaire data, Wehle concludes that firms enter lease transactions primarily for operating and funds flow considerations. The research indicates that financial ratio and tax factors play a role in the decision, but that they are only determinant "in very limited circumstances."[2]

It is interesting to compare Wehle's empirically-determined list of perceived benefits with the potential benefits discussed in the preceding sections. It can be seen that there is a discrepancy between the benefits which lessees perceive and those which may actually be realized from lease transactions. It appears that some firms may be leasing in the hope of attaining illusory advantages. Such questionable "advantages" as 100 percent financing and off balance sheet financing are obvious examples.

This raises important ethical questions for the lease marketer. Because of the confusion over the "true" benefits of leasing, the lessor may be in a position to take advantage of the lessee. A review of lessor promotional brochures reveals that many of the discredited "advantages" of leasing are employed in the marketing of leases. It is unclear,

---

[1]Ibid., p. VI-46. [2]Ibid., p. VI-57.

however, whether these are truly determining factors in the leasing decision. Wehle's research identified many factors which are "significant" in the lessee's decision process, but she concludes that three considerations are predominant: (1) the "inability to purchase the asset at a reasonable price, (2) a desire to maintain operating flexibility, and (3) the firm's definition of its own sphere of operation."[1] Given the general nature of these factors, it is impossible to determine the extent to which firms are misled by lessor marketing activities. Further research in this area is clearly needed.

Another factor which comes to light from Wehle's research is that many companies may not be aware of the true potential economic advantages of leases. While a number of firms indicated that they believe leasing to be less expensive than a similar amount of debt, the reasons for this belief were not investigated. For example, it was previously noted that a significant economic advantage may result from the investment tax credit "pass-through." Yet, Wehle determined that tax considerations are not a major factor in the respondents' decision process. This could, of course, be a function of the questionnaire and interview design or the specific sample which was chosen for investigation. On the other hand, it may be the result of a lack of knowledge on the part of the respondents. It is quite possible that industry is unaware of the sources of the potential economic advantages of leasing. If this is the case, lessors have the opportunity to raise awareness levels through a proper adaptation of their communications mix

---

[1] Ibid., pp. VI-54 to VI-55.

strategies. Again, further research is required to determine current awareness levels among present and prospective lessees.

A Model of the Lease versus Purchase Decision Process

It is possible to define lease marketing as the performance of those functions necessary to execute a transaction between lessee and lessor. However, this definition fails to capture the essential element of effective lease marketing: the provision of economic benefits to the lessee. It must be recognized that when a firm purchases an industrial product, it obtains one set of benefits and when it leases the same product, it obtains a different benefit set. As a result, lease marketing may be properly viewed as a product augmentation strategy.[1] Product augmentation recognizes that customers do not purchase physical products, they purchase the "expectation of benefits."[2] Augmentation seeks to provide these benefits in the form of additional services such as financing, packaging, customer advice, training, warehousing, delivery, or any other service which provides the consumer with utility. Leasing, therefore, may be viewed as one additional benefit which may be used to gain a competitive advantage in the market place.

Whether the lessor is the manufacturer of the product or one of the various types of leasing organizations, the concept of leasing as an augmentation strategy is applicable. The augmentation approach focuses upon the problem-solving nature of the customer's acquisition decision.[3]

---

[1]Theodore Levitt, Marketing for Business Growth (New York: McGraw-Hill, 1974), p. 14.

[2]Ibid., p. 8. [3]Lazer, p. 239.

It attempts to identify the benefits which the consumer may obtain from leasing and seeks to communicate these benefits to the relevant members of the customer's organization.

Effective communication of the potential benefits of leasing requires an understanding of the lessee's decision process. In this regard, a descriptive model of the lease versus purchase decision procedure has been developed. The purpose of the model is to identify the relevant variables in the decision process, to explicate the relationships among the variables and to focus attention on the unique role of lease versus purchase analysis models in the decision. It is also hoped that the model will serve to generate hypotheses for future research in this area. The model draws heavily upon the Sheth and Webster-Wind models of industrial buyer behavior.[1]

A graphic summary of the model is shown as Figure 1. The model may be viewed as a special case of the industrial purchasing process in which the acquisition decision involves a choice between lease and purchase. While the model is applicable to the situation in which the acquisition and lease-purchase decisions are made jointly, the following discussion will focus on the more common situation in which the decision to lease or purchase is made after it has been determined that the firm will acquire the asset. This will simplify the discussion and make it easier to concentrate on those factors which are unique to the lease-purchase decision.

As Sheth points out, industrial purchasing decisions may be made by individuals operating autonomously or collectively.[2] Thus, the

---

[1]See, Sheth; and Webster and Wind. [2]Sheth, p. 54.

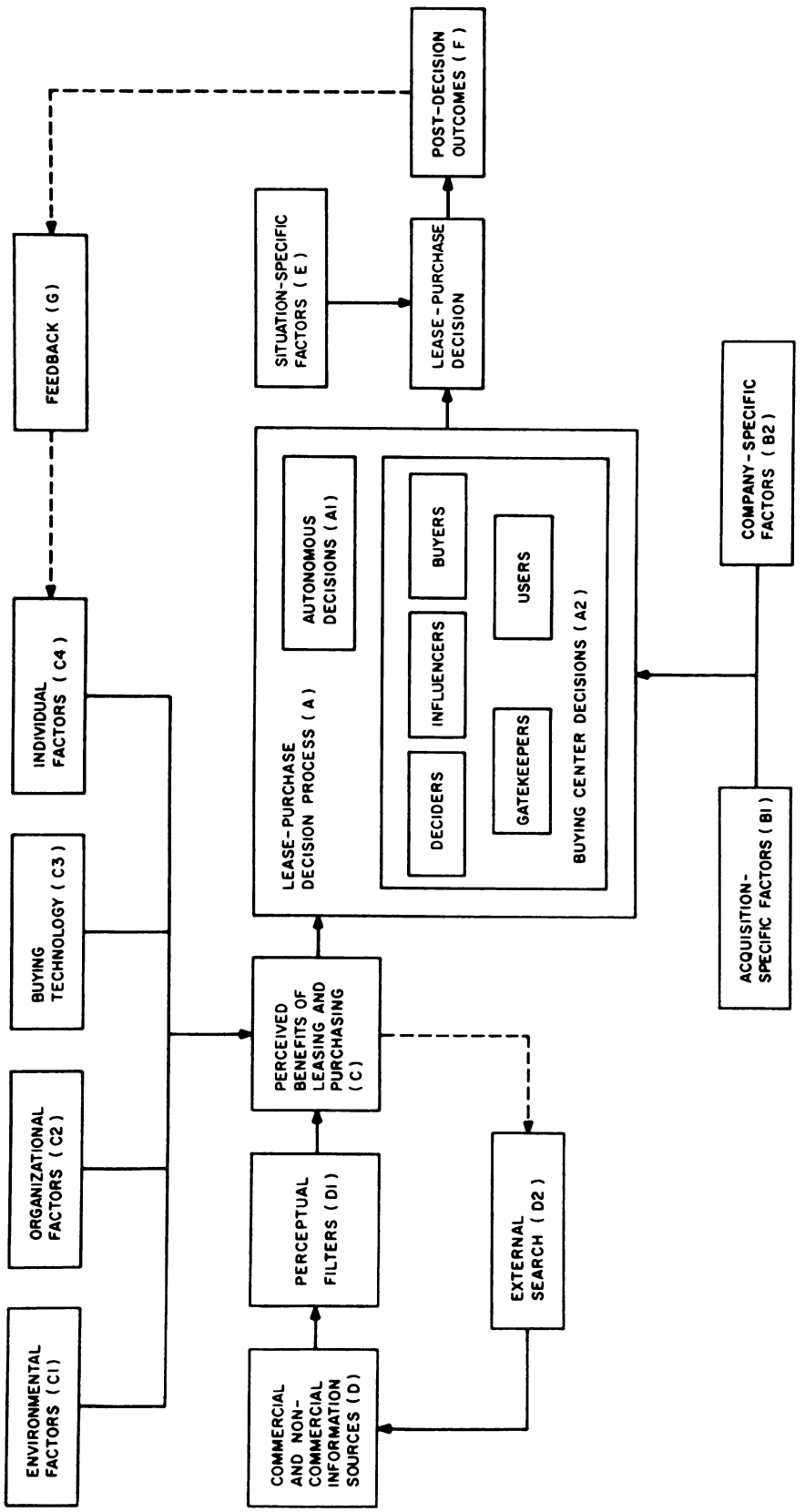

FIGURE 1. A MODEL OF THE LEASE VERSUS PURCHASE DECISION PROCESS.

lease-purchase decision process [(A) in Figure 1] may be either an individual decision (A1) or a buying-center decision (A2). Various factors interact to determine if a given lease-purchase decision will be made by a group or by a single person. These may be divided into acquisition-specific factors (B1) and company-specific factors (B2).[1]

Acquisition-specific factors include such elements as the amount of perceived risk associated with the decision and the type and size of the acquisition. If the cost of an incorrect decision is high and a good deal of uncertainty surrounds its outcomes, the decision is likely to be made within the buying center. Similarly, if the decision involves a major capital expenditure or if it is a first-time acquisition, the decision is also likely to be made by a group. Indeed, many large firms have institutionalized the buying center for large capital expenditures in the form of the capital budgeting committee. A third variable which will have an impact on whether the decision is made by an individual or by a group of individuals is the amount of time pressure involved. It is reasonable to assume that the greater the time pressure associate with the lease-purchase decision, the greater the likelihood it will be delegated to a single individual.

Company-specific factors include the firm's orientation, its size, and its degree of centralization. As Sheth points out, if the firm has a dominant orientation toward an area such as production or technology, it is likely that the decision will be made by personnel in those areas.[2] If the firm should have a strong financial orientation, it is probable that the acquisition decision will be made by those

---

[1]Ibid. [2]Ibid.

persons most closely associated with the use and control of the asset, while the lease-purchase determination will be made by the financial group. It is also likely that the decision will be made by a group in the larger, more centralized organization.

In those organizations in which the lease-purchase decision is made by a group, the relevant unit of analysis is the buying center. Webster and Wind define the buying center as those perons "who interact for the specific purpose of accomplishing the buying task."[1] Depsite the obvious transfer-of-title orientation of this term, it is used in Figure 1 to represent those individuals who interact for the purpose of making the lease-purchase decision. Within the buying center there exists the potential for individuals to act in the familiar roles of deciders, influencers, buyers, users, and gatekeepers.[2] Frequently, the same individual will assume multiple roles during the decision process. Depending upon the organization, the buying center may be an informal group or it may be formally sanctioned and highly structured, as in the case of a capital budgeting committee.

Of particular interest in the decision process is the person who operates in the role of the analyst-influencer. The analyst-influencer is the individual who has the responsibility for performing the financial analysis of the lease versus purchase decision. In most firms, this individual will be a member of the financial organization and will have a formal title which may range from controller to financial analyst. It is the analyst-influencer who applies the firm's buying technology (the lease-purchase analysis methods) to the decision problem and

---

[1]Webster and Wind, p. 35. [2]Ibid., pp. 78-80.

recommends a course of action.[1] The analyst's impact on the group decision will be a function of many factors, including his expertise (as perceived by the other group members), his status and power within the organization, and his track record.

The analyst's recommendation to the buying center will be determined, in large part, by the particular lease-purchase analysis model he employs. Each analyst has a wide variety of methodologies from which to choose. It will be demonstrated in Chapter III that different methodologies will generate different accept-reject decisions for the same set of data. As a result, the analytical model employed by the firm can have a major impact on the lease-purchase decision process. This is particularly true in situations in which the final lease-purchase determination is delegated to the analyst-influencer as an autonomous decision. A situation such as this might result in firms which make the acquisition decision within the buying center but refer the financing decision (lease versus borrow and buy) to the controller. In this instance, the analyst-influencer is also acting in the role of the decider.

Of course, the firm's buying technology (C3) and the analyst-influencer's recommendations are not the only factors which determine the outcome of the lease-purchase process. The lease-or-buy decision must be viewed within the context of the entire range of perceived benefits resulting from the acquisition. For example, if the analytical

---

[1] Buying technology may be defined as the problem-solving procedures employed by the firm. With regard to lease-purchase decisions, this involves the lease versus purchase analysis models used by the analyst-influencer.

model indicates that the purchase is slightly more attractive than the lease, the firm may nevertheless choose to lease the equipment if it believes that the "advantages" of off balance sheet accounting treatment outweigh the financial disadvantages of the transaction. It is, therefore, of critical importance to identify the variables which affect the lease-purchase benefit set.

Many factors interact to determine the perceived benefit set of the persons involved in the decision process. Individual factors (C4) including background, education, task orientation, and previous experience with lease-purchase decisions (feedback) are an important influence on the perceived benefit set. For instance, an individual may have a negative attitude toward financial leases because of a belief that leases are always more expensive than a comparable amount of debt financing. This belief may be a function of the individual's educational experiences, since, in the past, the potential economic benefits of leasing have not been clearly articulated by writers in the fields of accounting and finance. As a result, an important opportunity exists for lease marketers to educate relevant members of the organization to the potential benefits of leasing.

The educational process, of course, depends upon the promotional program of the lessor. As Figure 1 suggests, certain external information sources (D) are under the control of the lease marketer. These sources include advertising, sales promotion, and personal selling. It is important to recognize that the various elements of the promotional mix must overcome the perceptual filtering process (D1) before they can have an impact on the perceived benefit set of the

prospects.[1] In addition, the members of the organization are exposed to various noncommercial information sources. These alternative communications stimuli may serve to complement the lessor's promotional efforts or they may compete with the objectives of the promotional program. As such, communications mix strategies must be carefully planned and coordinated in order for them to have their intended effect on those persons involved in the decision process.

In addition to communicating the relevant benefits of leasing, the lessor's promotional campaign may be able to suggest alternative buying technologies for the analysis of lease-purchase decisions. A properly trained sales force may be able to educate the relevant analyst-influencer to advanced models which more accurately reflect the financial advantages of leasing. A carefully designed and integrated promotional program may be able to stimulate external search behavior (D2) on the part of the analyst. If this results in contact with the lessor's sales force, the opportunity may exist to analyze the firm's decision model and to suggest appropriate changes. Depending upon the specifics of the situation, such contact may lead to a favorable recommendation with regard to leasing.

Other factors which influence the benefit set include environmental (C1) and organizational (C2) variables. Significant environmental factors include tight money conditions, inflationary expectations, changes in tax laws and accounting regulations, competitive conditions in the capital markets, and seasonal fluctuations

---

[1] James F. Engel, Hugh G. Wales, and Martin R. Warshaw, Promotional Strategy, 3rd ed. (Homewood, IL: Richard D. Irwin, 1975), pp. 57-71.

in the firm's sales. These factors may operate individually or in combination to affect the relative merits of leasing versus owning for a particular firm. As an example, it was previously noted that one of the most salient advantages of leasing is the ability of firms with low or sheltered earnings to take advantage of the investment tax credit. However, changes in the relevant tax laws or the tax status of the firm could significantly affect this potential advantage. Similarly, tight money conditions or inflationary expectations could affect a firm's perceptions of its future credit availability. Such a situation might encourage a firm to view leasing as a means of "preserving" its credit lines.

Organizational factors which impact the perceived benefit set include the capital expenditure authority of middle-level management, internal accounting and control procedures, and the availability and quality of in-house maintenance service. Any one of these factors may act to make leasing appear more or less attractive. For example, a division or subsidiary manager may be able to circumvent a corporate capital budgeting committee by leasing rather than purchasing if a particular acquisition exceeds his expenditure authority. Similarly, the status of internal maintenance may cause a manager to lease in order to secure reliable repair service.

Whatever the final composition of the perceived benefit sets of the individuals involved, the final decision process (A) will resolve itself in terms of conflict resolution in the case of buying center decisions and individual deliberation in the case of autonomous decisions. Sheth notes that conflict among buying center members is

the natural consequence of joint decision making. It arises from differential motivations and expectations among the parties to the decision process.[1] In particular, differential perceptions concerning the potential benefits of leasing may lead to conflicts among individuals from different functional areas. These disagreements will arise partly out of different educational backgrounds and partly as a result of "company policy of reward for specialized skills and viewpoints."[2]

Conflict among buying center members is not necessarily bad. The important question is how the conflict is resolved. If resolution results from a rational process of problem solving, information seeking and persuasion, the resultant decision is likely to be congruent with organizational goals. On the other hand, if resort is made to bargaining and politicking, the result is likely to be dysfunctional from the standpoint of corporate objectives.[3]

The final outcome of the decision process is likely to be affected by situation-specific factors (E). These include all of the unpredictable variables which relate to a specific decision setting. Such production-related events as strikes, machine breakdowns, and temporary increases in product output may have an impact on the decision. Other variables might involve ad hoc changes in factor market conditions. Examples include changes in promotional efforts, new product introductions, and changes in prices or terms. Organizational changes such as mergers and acquisitions may also play a role in the final outcome.[4]

---

[1]Sheth, p. 55. [2]Ibid. [3]Ibid. [4]Ibid., p. 56.

Once the final decision to lease or purchase is made, the participants in the decision process will have an opportunity to monitor the outcomes (F) through the firm's internal information system (G). This feedback loop is an important factor for future lease-purchase decisions. As the organization gains knowledge and experience in dealing with lease-or-buy problems, the decision process itself may evolve into a more routinized procedure. Formal decision rules may be adopted and the decision may be delegated to a single individual or department. The lease marketer, in dealing with an organization of this type, will find it very difficult to change established procedures and analysis methods. In most cases, it will fall to the sales force to identify the lease-purchase decision makers and attempt to effect changes in the decision process.

Summary and Conclusions

This chapter has attempted to outline the major elements in the lease marketing process. The important participants in the leasing industry have been identified as manufacturer lessors, captives, independents, and bank lessors. While each is seen to have its own unique characteristics, it was pointed out that there is also a certain amount of overlap with regard to the types of contracts written and the services performed. Four basic types of lease contracts were identified: financial leases, leveraged leases, sale-leaseback arrangements, and operating leases. The central focus of this dissertation is upon the financial lease.

It has been noted that the potential benefits of leasing are of particular concern to the lease marketer. This chapter has viewed the

lease as a bundle of economic and noneconomic benefits. It was suggested that one of the most important functions of lease marketing is to communicate these benefits to the industrial consumer. Seven potential economic benefits of leasing have been identified. The realization of these benefits is seen to depend largely on situational factors. In addition, it appears that certain types of lessors are better able than others to generate various economic advantages.

A number of other economic and noneconomic "benefits" of leasing have been identified. It has been shown, however, that some are of questionable validity. Moreover, a number of the "noneconomic" advantages appear to be special cases of Nantell's list of economic benefits.

It has also been noted that there may be an information gap within industry concerning the potential advantages of leasing. A review of Wehle's empirical study suggests that many firms may be leasing in an attempt to obtain illusory benefits. Additional research is recommended, however, in order to focus on the more salient benefits which are sought by industrial consumers and to identify the exact nature of the information gap.

In the final section of the chapter, a model of the lease versus purchase decision process was introduced. The model views the lease-purchase decision as a special case of the industrial buying process. Its central focus is on the perceived benefit set and the factors which interact to determine these benefits. Of particular interest to the present research is the individual who operates in this process as the analyst-influencer. By applying the firm's financial analysis

techniques to the lease-or-buy alternatives, the analyst-influencer is seen as an important contributor to the final decision. The particular financial model employed by the analyst was identified as the major factor in determining his recommendation. Given the controversy over the appropriateness of the many available techniques, an important opportunity is seen to exist for lease marketers to promote analysis models which reflect the true economic advantages of leasing. In the following chapter, the important lease-purchase decision models are analyzed and compared. This will set the stage for the empirical findings on current corporate practice with regard to lease-purchase analysis models.

CHAPTER III

A SURVEY AND SYNTHESIS OF LEASE VERSUS PURCHASE MODELS

Introduction

The purpose of this chapter is to review the important lease versus purchase methodologies which exist in the literature. The focus will be upon the historical development of these models and their similarities and dissimilarities. One objective of the chapter is to demonstrate that lease analysis theory developed in an orderly and sequential fashion as writers attempted to improve upon the models of their predecessors. Each new model generally added one or two new elements designed to correct what were perceived to be weaknesses in previous approaches. This process of building upon the foundations of previous models has led to an underlying similarity among the various methodologies. Indeed, it can be shown that a number of models which appear to be quite different are, in reality, formally identical.

An implicit theme of the chapter is that the form of a lease-purchase model is, in large part, a function of the theorist's conceptual orientation. That is, a writer's theoretical view of the leasing problem is a major factor in determining the kind of analytical model he will develop. Many of the early writers, for example, considered the lease to be an alternative financing instrument to debt. As a result, their models are lease versus borrow approaches. In contrast, some contemporary writers view the lease as a hybrid,

containing elements of investment and financing. The models developed by these theorists attempt to consider both elements simultaneously. In addition, the newer approaches draw quite heavily on modern capital asset pricing theory and its implications for corporate investment decisions.

A numerical example will be used to compare and contrast the various approaches. The example will be used to demonstrate the relative magnitude of the differences among the models and to make the theoretical discussion more concrete. Whenever possible, attempts will be made to generalize concerning consistent biases which may be present in the various methodologies.

This chapter deals only with discounted cash flow models. Discounted cash flow is appropriate to the lease-purchase problem because the cash streams resulting from the decision take place over a period of years. The discounting mechanism adjusts for the timing differences, thus allowing the decision maker to compare the various cash flows. Although a few models have been excluded because they are redundant, all of the important discounted cash flow methods are discussed. The first section of the chapter is devoted to methodologies which employ the net present value approach. The second deals with those models which use an internal rate of return criterion.

To facilitate comparisons among the different approaches, all of the models have been converted to equation form using a common set of variables. A listing of the most frequently used symbols follows. Additional variables will be defined as they are needed.

The following symbols and definitions will be employed throughout the remaining chapters:

A_o = cash purchase price of the asset,

R_i = lease payment required in year i,

D_i = depreciation charge for year i allowed for tax purposes,

I_i = interest on a loan or loan equivalent in year i (primes indicate different methods of computing the equivalent loan),

C_i = total pre-tax operating costs expected to be required to operate the asset in year i if it is purchased,

O_i = total pre-tax cash operating costs expected to occur in year i if the firm purchases the asset, but not if the asset is leased; this includes such things as insurance, maintenance and property taxes covered by the lessor,

C_i-O_i = total pre-tax cash operating costs expected in year i if the asset is leased,

V_n = expected after-tax salvage value of the asset at the end of year n,

S_n = expected pre-tax salvage value of the asset at the end of year n,

B_n = expected book value of the asset at the end of year n,

Z_i = total cash revenues expected to be generated by the asset in year i,

P_i = outstanding principal on a loan or loan equivalent in year i (primes indicate different methods of computing the equivalent loan),

L_i = payment of principal and interest on a loan or loan equivalent in year i (primes indicate different methods of computing the equivalent loan),

Q_i = principal repayment component of the loan or loan equivalent payments in year i (primes indicate different methods of computing the equivalent loan),

J_o = present value of the lease payments,

n = useful economic life of the asset in years,

t = corporate average and marginal tax rate on ordinary income,

t_g = tax rate applicable to gains and losses on the disposal of capital assets,

k_t = after-tax weighted average cost of capital for the firm,

k_m = the firm's opportunity investment rate,

r = pre-tax interest rate on intermediate-term debt,

$r_t = r(1-t)$, after-tax interest rate on intermediate-term debt,

r_ι = face rate of return to lessor,

ρ = pre-tax cost of leasing (internal rate of return), and

ρ_t = after-tax cost of leasing (internal rate of return).

Net Present Value Models

The Eiteman and Davisson model

The earliest attempt to apply the discounted cash flow technique to the lease versus purchase problem appears in Eiteman and Davisson's 1951 monograph.[1] A simplified version of their model is shown as Equation (1):

$$A_o^* = \sum_{i=0}^{n-1} \frac{R_i}{(1+k_m)^i} + \frac{S_n}{(1+k_m)^n} \qquad (1)$$

where A_o^* = the maximum profitable purchase price of the asset.

In essence, Equation (1) calculates the present value of the lease payments plus the pre-tax salvage value foregone by leasing. Both terms are discounted at the opportunity investment rate, which Eiteman and Davisson define as "the most profitable rate of return from an alternative investment of funds."[2] The implied decision rule would be to lease if $A_o^* < A_o$, where A_o equals the actual purchase price of the asset. Thus, the comparison is between the present value cost of leasing and the present value cost of purchase.

---

[1] Eiteman and Davisson, pp. 43-57. [2] Ibid., p. 43.

While there are a number of problems with this formulation, perhaps the most obvious is its failure to consider the federal income tax.[1] Lease payments and depreciation expense provide tax shields which should be included in the equation. In addition, it is the sacrifice of after-tax salvage value which should be recognized as a cost of leasing. S_n requires an adjustment to reflect the tax rate applicable to gains and losses on the disposal of fixed assets.

It is also possible to question Eiteman and Davisson's use of k_m as the discount rate and their failure to deal with the implicit debt financing associated with the lease. However, these considerations will be dealt with in connection with other lease-purchase analysis models.

From the standpoint of the development of financial analysis methodologies, Eiteman and Davisson must be credited as pioneers in the application of discounted cash flow techniques to the lease versus purchase problem.[2] It is clear that their work led, shortly thereafter, to the development of the "conventional methodology," which is the first of the modern methods of lease-purchase analysis.[3]

---

[1]Eiteman and Davisson apparently believe that taxes are irrelevant to the lease versus purchase decision. For an illustration of their confusion on this point, see, ibid., pp. 58-64.

[2]Prior to the publication of Eiteman and Davisson's work, most attempts to analyze the lease versus purchase question were either qualitative in nature or, if they were quantitative, they did not employ discounted cash flow techniques. See, for example: McNeill; Ernest S. Alsopp, "Industrial Financing by Purchase Lease," The Appraisal Journal 16 (April 1, 1948): 156-64; John J. Wilson, Jr., "Industrial Financing Through Own-Lease; 'What-Why-How' of the Method," The Controller 17 (February 1949): 60.

[3]Eiteman served on the doctoral committee of Albert H. Cohen who first presented the "conventional methodology" in his Ph.D. dissertation: Albert H. Cohen, "Long-Term Net Leasing Practice: Problems of Taxation, Finance and Accounting" (Ph.D. dissertation, University of Michigan, 1953), pp. 137-58.

The conventional methodology

The conventional methodology is a lease versus borrow rather than a lease versus purchase analysis. That is, the problem is viewed as one of determining the lowest cost method of financing the firm's operations. If the firm is in need of a certain amount of intermediate-term financing in order to acquire the services of a capital asset, a lease is considered to be an alternative to a bank loan. The requisite cash flows under each alternative are discounted at an appropriate rate, and the financing method with the lowest present value "cost" is selected. Note that the decision to acquire the asset is not at issue.[1] This approach assumes that a previous investment analysis has determined that the acquisition of the asset's services is profitable from a capital budgeting standpoint. The apparent circularity in this line of reasoning has been pointed out by Johnson and Lewellen and will be discussed in a later section.[2]

The conventional approach is probably the best known of the lease analysis methodologies. Slightly modified versions of the method are still recommended by many contemporary textbooks.[3] Rarely, however, is a specific writer's name linked with the conventional model. While the

---

[1]J. Fred Weston and Eugene F. Brigham, Managerial Finance, 4th ed. (Hinsdale, IL: Dryden Press, 1972), p. 462.

[2]Robert W. Johnson and Wilbur G. Lewellen, "Reply," Journal of Finance 28 (September 1973), p. 1025.

[3]See, for example: Weston and Brigham, 5th ed., pp. 478-81; Erwin Esser Nemmers and Alan E. Grunewald, Basic Managerial Finance, 2nd ed. (St. Paul, MN: West Publishing Co., 1975), pp. 320-37; George N. Engler, Business Financial Management (Dallas, TX: Business Publications, 1975), pp. 445-51; and R. L. Johnson, Financial Decision Making (Pacific Palisades, CA: Goodyear Publishing Co., 1973), pp. 279-93.

best known presentation appears in Weston and Brigham's 1966 text,[1] the earliest published version of the conventional approach is found in Cohen's 1954 monograph.[2]

The Cohen model

Cohen presents his model within the context of a sale-leaseback transaction, but his approach is easily generalized to any type of financial lease. As with all conventional methodologies, he assumes that the purchase of the asset will be financed with 100 percent debt. Thus, the net present value cost of the borrow-buy alternative is equal to the present value of the loan payments minus the present value of the tax shield provided by the depreciation and interest expense.[3]

$$NPVC(D) = \sum_{i=1}^{n} \frac{L_i}{(1 + r)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1 + r)^i} - \sum_{i=1}^{n} \frac{tI_i}{(1 + r)^i} \qquad (2)$$

where NPVC(D) = the net present value cost of the debt alternative.

The "discounted net cost of leasing"[4] is given by the present value of the after-tax lease payments plus the present value of the after-tax salvage value foregone by leasing:

---

[1] J. Fred Weston and Eugene F. Brigham, Managerial Finance, 2nd ed. (New York: Holt, Rinehart and Winston, 1966), pp. 376-78.

[2] Albert H. Cohen, Long Term Leases: Problems of Taxation, Finance and Accounting (Ann Arbor: University of Michigan Press, 1954), pp. 87-102.

[3] Cohen's original model assumed that all cash flows occurred at the end of each six month period. For purposes of comparability, Equations (2) and (3) have been adjusted so that cash flows are assumed to occur at the end of each year.

[4] Cohen, Long Term Leases, p. 92.

$$NPVC(L) = \sum_{i=1}^{n} \frac{R_i}{(1 + r)^i} - \sum_{i=1}^{n} \frac{tR_i}{(1 + r)^i} + \frac{V_n}{(1 + r)^n} \qquad (3)$$

where NPVC(L) = the net present value cost of the lease alternative.

Subtracting Equation (3) from Equation (2) and rearranging, we obtain the net present value advantage of leasing (NAL):

$$NAL = NPVC(D) - NPVC(L)$$

$$NAL = \sum_{i=1}^{n} \frac{L_i}{(1 + r)^i} - \sum_{i=1}^{n} \frac{R_i}{(1 + r)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1 + r)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1 + r)^i}$$

$$- \sum_{i=1}^{n} \frac{tI_i}{(1 + r)^i} - \frac{V_n}{(1 + r)^n} \qquad (4)$$

The decision rule would be to lease the asset if NAL > 0.

One of the interesting features of Cohen's approach is his failure to specify the appropriate discount rate for Equation (4). The discount rate he uses in his example is the pre-tax rate of interest on the loan. However, he states that this choice is "purely arbitrary."[1] Cohen's initial example assumes that the loan rate is equal to the "face rate of return" to the lessor,[2] and he suggests that a somewhat higher rate of

---

[1] Ibid., p. 89n.

[2] The "face rate of return" to the lessor is the interest rate which discounts the lease payments back to the purchase price of the asset. It is found by solving the following equation for r_l:

$$0 = -A_0 + \sum_{i=1}^{n} \frac{R_i}{(1 + r_l)^i}$$

discount may be appropriate.[1] Unfortunately, he does not specify how this rate should be determined.

Cohen's failure to specify the discount rate is significant in light of the fact that much of the contemporary debate over lease-purchase models centers on the question of the appropriate discount rates. Because of the ambiguity concerning the rate of discount, Cohen's model lacks generality. As a necessary condition for a lease versus purchase methodology to be considered a general model, it must either designate the appropriate discount rates or, failing this, it must at least specify a theory which describes how these rates are to be determined.

The Weston and Craig and early Weston and Brigham models

Cohen was not the only early writer to neglect to specify the rate of discount. In 1960 Weston and Craig presented a model which is virtually identical to Cohen's.[2] The only difference is that Weston and Craig assume a zero salvage value:

$$NAL = \sum_{i=1}^{n} \frac{L_i}{(1+r)^i} - \sum_{i=1}^{n} \frac{R_i}{(1+r)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1+r)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+r)^i} - \sum_{i=1}^{n} \frac{tI_i}{(1+r)^i} \qquad (5)$$

Thus, the sixth term on the right hand side of Cohen's Equation (4) does not appear in Weston and Craig's model.

---

[1] Cohen, Long Term Leases, p. 89n.

[2] J. Fred Weston and Rupert Craig, "Understanding Lease Financing," California Management Review 2 (Winter 1960): 67-75.

Weston and Craig also use the pre-tax loan rate to discount the various cash flows but give no justification for the use of this particular discount rate. The apparent reason is that their stated objective in developing the model is to show that "it is possible to set up a transaction in which there is no advantage from a financial standpoint to either leasing or owning."[1] (Indeed, their numerical example shows a net present value disadvantage to leasing of a negligible $4.46.) Clearly, Weston and Craig were not attempting to develop a general lease-purchase analysis method at this particular time.

The Weston and Craig model served as a basis for the development of the well-known Weston and Brigham lease analysis models. When Weston wrote Managerial Finance in 1962, he presented the Weston and Craig model without alteration in his chapter on short and intermediate-term financing.[2] In 1966, however, Eugene F. Brigham joined Weston as coauthor, and an attempt was made to present a general lease-purchase analysis methodology.[3] This was accomplished by specifying the after-tax weighted average cost of capital as the appropriate rate of discount in the original Weston and Craig equation:

$$NAL = \sum_{i=1}^{n} \frac{L_i}{(1+k_t)^i} - \sum_{i=1}^{n} \frac{R_i}{(1+k_t)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1+k_t)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+k_t)^i} - \sum_{i=1}^{n} \frac{tI_i}{(1+k_t)^i} \qquad (6)$$

---

[1] Ibid., p. 68.

[2] J. Fred Weston, Managerial Finance (New York: Holt, Rinehart and Winston, 1962), pp. 305-308.

[3] Weston and Brigham, 2nd ed., pp. 376-81.

Equation (6) is probably the best known version of the conventional approach. It is this model, with some slight variations, which appears in many of the popular textbooks published in the late 1960s.[1]

It is interesting to consider the special case of Equation (6) when r, the rate of interest on the loan, equals r_ℓ, the face rate of return to the lessor.[2] In this instance, L_i will equal R_i (assuming level lease and debt payments), and Equation (6) reduces to:

$$NAL = \sum_{i=1}^{n} \frac{tR_i}{(1+k_t)^i} - \sum_{t=1}^{n} \frac{tD_i}{(1+k_t)^i} - \sum_{i=1}^{n} \frac{tI_i}{(1+k_t)^i} \qquad (6')$$

Thus, the lease versus borrow decision becomes a question of comparative tax shields. While the total tax shield under the two alternatives is the same (that is, $tR_i = tD_i + tI_i$), the tax shields under the borrow-buy option are greater in the early years because of accelerated depreciation and the annuity method of calculating interest on term loans. As a result, NAL will be negative for all values of k_t greater than zero, and the debt alternative will be preferred. In other words, the differential timing of the tax shield cash flows favors ownership when $r = r_\ell$.[3]

Similar generalizations concerning the sign of NAL are not possible when $r \neq r_\ell$. The outcome will depend to a large extent on the

---

[1] See, for example: James C. Van Horne, Financial Management and Policy (Englewood Cliffs, NJ: Prentice-Hall, 1968), pp. 264-66; Elvin F. Donaldson and John K. Pfahl, Corporate Finance, 3rd ed. (New York: Ronald Press Co., 1969), pp. 262-64; and James C. T. Mao, Quantitative Analysis of Financial Decisions (New York: Macmillan Co., 1969), pp. 323-24.

[2] Note that this may not be an unreasonable assumption under strong competitive conditions.

[3] See, for example, Weston and Brigham, 2nd ed., p. 377.

relative magnitudes of r, r_l, and k_t. In addition, if it is assumed that less than 100 percent financing is available under the debt alternative or if compensating balances are required, the analysis could shift in favor of leasing even if $r = r_l$.[1]

A number of important criticisms have been leveled against the conventional methodology. One of the earliest writers to question this approach was Richard Vancil.[2] It is Vancil's contention that the net present value advantage of the lease calculated using the conventional model reflects the intermingled effects of the tax shields and the amount of financing provided by each alternative. Typically, the lease and debt alternatives provide the firm with different amounts of financing over the life of the asset.[3] Vancil argues that it is desirable to eliminate from the analysis the difference in the amount of financing because alternative means of finance are always available to the firm. In other words, the lease-or-buy decision should focus on the differential tax effects of the two alternatives and should not be influenced by the amount of financing provided by each plan.[4] It is this concern which led Vancil to develop his own lease-purchase model, known as the Basic Interest Rate method.[5]

---

[1]See, for example, Mao, p. 327.

[2]Richard F. Vancil, "Lease or Borrow: New Method of Analysis," Harvard Business Review 39 (September-October 1961), reprinted in Leasing Series (Boston: Harvard Business Review, n.d.,), pp. 79-93.

[3]Mao, p. 328. [4]Vancil, "New Method," p. 89.

[5]Ibid., pp. 79-93.

The Basic Interest Rate (BIR) method

Unlike the conventional model, the BIR method is not a strict lease or borrow analysis. Indeed, the primary objective of Vancil's technique is to eliminate the differential effects of financing from the lease-purchase comparison. For the purchase alternative, this is done by calculating the net present value cost of purchase as shown in Equation (7):[1]

$$NPVC(P) = A_o - \sum_{i=1}^{n} \frac{tD_i}{(1+k_t)^i} \tag{7}$$

where NPVC(P) = the net present value cost of purchase. Equation (7) makes no assumptions concerning the method of financing the purchase. This in in contrast to Equation (2) which explicitly assumes the acquisition is financed with 100 percent debt:

$$NPVC(D) = \sum_{i=1}^{n} \frac{L_i}{(1+r)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+r)^i} - \sum_{i=1}^{n} \frac{tI_i}{(1+r)^i} \tag{2}$$

Following a similar line of reasoning, one might expect the BIR method to calculate the cost of leasing as the present value of the lease payments net of the present value of the tax shield provided by the lease expense:

$$NPVC(L) = \sum_{i=1}^{n} \frac{R_i}{(1+k_t)^i} - \sum_{i=1}^{n} \frac{tR_i}{(1+k_t)^i} \tag{8}$$

However, Vancil argues that the lease payments include an implied

---

[1]Vancil's original model assumed a zero salvage value. For his recommended treatment of salvage, see, Richard F. Vancil, "Lease or Borrow: Steps in Negotiation," Harvard Business Review 39 (November-December 1961), reprinted in Leasing Series (Boston: Harvard Business Review, n.d.), pp. 94-109.

interest charge which must be removed in order to make the lease alternative comparable to the purchase alternative.[1] This is done by adjusting both terms in Equation (8). First, the implicit financing in the tax shield term is neutralized by backing an implied interest tax shield out of the tax savings provided by the lease payments. Vancil makes this adjustment because there is a tax advantage in writing off the lease payments instead of the depreciation expense.[2] That is to say, the present value of the tax savings from Equation (8) will exceed the present value of tax savings from Equation (7):

$$\sum_{i=1}^{n} \frac{tR_i}{(1+k_t)^i} > \sum_{i=1}^{n} \frac{tD_i}{(1+k_t)^i} \qquad (9)$$

Vancil argues that this is not a true advantage, however, since alternative debt financing (and an interest tax shield) could be obtained if the lease commitments are not undertaken.

Under the assumption that alternative debt financing is available, Vancil constructs an "equivalent loan" in order to determine the amount of the interest tax shield that should be removed from the lease payments' tax shield.[3] The equivalent loan is meant to represent the bank loan which would be available to the firm if it does not enter

---

[1] Under a "full-payout" or financial lease, the sum of the lease payments exceeds the cost of the asset. Thus, Vancil views the excess over the purchase price as the implicit rate of "interest" earned by the lessor.

[2] Myron J. Gordon, "A General Solution to the Buy or Lease Decision: A Pedagogical Note," Journal of Finance 29 (March 1974): 247-48.

[3] McEachron was actually the first to apply the equivalent loan concept to the lease or purchase decision. See, William D. McEachron, "Leasing: A Discounted Cash-Flow Approach," The Controller 29 (May 1961): 213-19.

into the lease. Thus, it must be "equivalent" to the lease in its amount and in the timing of its payments.

Vancil creates the loan by assuming a principal amount A_o equal to the purchase price of the asset, and an interest rate r equal to the firm's pre-tax cost of intermediate-term debt. The latter is the Basic Interest Rate and is defined as the minimum rate the firm would have to pay to secure an equivalent amount of funds for an equivalent time period. The lease payments R_i become the repayments of interest and principal on the loan. Thus, if we assume the following:[1]

A_o = \$15,000

R_i = \$4,200

r = 8 percent, and

n = 5 years,

an amortization schedule for the equivalent loan would be as shown in Table 1.[2] Note that the lease payments in the second column "overamortize" the principal amount of \$15,000. This is because the return implicit in the lease (12.38 percent)[3] exceeds the basic interest rate of 8 percent.

---

[1]These figures are taken from the example which appears in Robert W. Johnson and Wilbur G. Lewellen, "Analysis of the Lease-or-Buy Decision," Journal of Finance 27 (September 1972), p. 820.

[2]To be consistent with Johnson and Lewellen's example, Table 1 assumes that the lease payments are due at the end of each year.

[3]Calculated as follows:

$$0 = -A_o + \sum_{i=1}^{n} \frac{R_i}{(1 + r_l)^i}$$

$$0 = -15{,}000 + \sum_{i=1}^{5} \frac{4{,}200}{(1 + r_l)^i} \qquad r_l = .1238$$

TABLE 1

AMORTIZATION SCHEDULE FOR VANCIL'S EQUIVALENT LOAN

End of Year	R_i "Loan" Payment	I'_i "Interest"	Q'_i "Principal" Repayment	P'_i Remaining Balance
0	---	---	---	$15,000
1	$ 4,200	$1,200	$ 3,000	12,000
2	4,200	960	3,240	8,760
3	4,200	701	3,499	5,261
4	4,200	421	3,779	1,482
5	4,200	119	4,081	
	$21,000	$3,401	$17,599	

The present value of the tax shield provided by the "equivalent interest" of column 3 enters Equation (8) as a positive number in order to reduce the tax savings provided by the lease payments:

$$NPVC(L) = \sum_{i=1}^{n} \frac{R_i}{(1+k_t)^i} - \sum_{i=1}^{n} \frac{tR_i}{(1+k_t)^i} + \sum_{i=1}^{n} \frac{tI'_i}{(1+k_t)^i} \qquad (8')$$

where I'_i = the interest on the equivalent loan. Thus, the first adjustment to Equation (8) removes the differential financing element from the lease tax shield.

The second adjustment corrects for the incremental cost of the higher interest rate implicit in the first term of Equation (8'). Vancil views the Basic Interest Rate as "an unavoidable cost of any financing plan."[1] As a result, he "penalizes" the lease alternative to the extent that it involves an interest rate which is higher than

[1] Vancil, "New Method," p. 90.

the BIR. This is done by discounting R_i at the Basic Interest Rate instead of the cost of capital:

$$NPVC(L) = \sum_{i=1}^{n} \frac{R_i}{(1+r)^i} - \sum_{i=1}^{n} \frac{tR_i}{(1+k_t)^i} + \sum_{i=1}^{n} \frac{tI'_i}{(1+k_t)^i} \qquad (8")$$

The full impact of this adjustment will be seen more easily when Equation (8") is subtracted from Equation (7) in order to determine the net present value advantage of the lease.[1]

$$NAL = NPVC(P) - NPVC(L)$$

$$NAL = A_o - \sum_{i=1}^{n} \frac{R_i}{(1+r)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+k_t)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1+k_t)^i}$$

$$- \sum_{i=1}^{n} \frac{tI'_i}{(1+k_t)^i} \qquad (9)$$

Equation (9) has been rearranged so that the cash outflows under each alternative are represented by the first two terms on the right hand side and the tax savings are represented by the last three terms.[2] The difference between the first two terms represents what Vancil calls the "lessor's premium."[3] It is the difference between the purchase price outflow and the present value of the lease payments outflow. As long as the implicit interest rate on the lease exceeds the cost of alternative

---

[1]The indexing of Equation (9) assumes that lease payments are due at the end of each year. While Vancil's model assumes prepayment, the adjustment has been made to facilitate comparisons with other models.

[2]This is similar to the approach taken by Bower. See, Richard S. Bower, "Issues in Lease Financing," Financial Management 2 (Winter 1973), p. 26.

[3]Vancil, "New Method," p. 92.

means of finance (the BIR), the lessor's premium in Equation (9) will be negative. In other words, the lease will be charged with an additional amount reflecting the incremental interest cost of the lease over and above the firm's Basic Interest Rate. From the lessor's standpoint, this premium represents "a payment . . . for assuming the auxiliary financing costs connected with the transaction and for his profit or fee for arranging the transaction."[1] In the special case in which $r = r_l$, the first two terms would cancel, and the net advantage of leasing would be determined by the present value of the comparative tax shields. This is analogous to the special case presented in Equation (6').

The last two terms in Equation (9) represent what Vancil refers to as the "equivalent depreciation" tax shield.[2] The net "equivalent depreciation" shield enters as a positive number to offset the tax savings on the depreciation foregone by leasing rather than purchasing. To the extent that,

$$\sum_{i=1}^{n} \frac{tR_i}{(1+k_t)^i} - \sum_{i=1}^{n} \frac{tI'_i}{(1+k_t)^i} > \sum_{i=1}^{n} \frac{tD_i}{(1+k_t)^i}$$

the tax effect would favor leasing. However, no generalizations can be made concerning a consistent bias in Equation (9).[3] As in the case of

---

[1] Ibid. It should be pointed out that r_l need not exceed r in order for the lessor to make a profit. Factors such as accelerated depreciation, the federal income tax rate, the investment tax credit, and estimated residual values may make the lease profitable even if $r_l < r$.

[2] Ibid., p. 91.

[3] This is in agreement with Findlay's assessment. See, M. Chapman Findlay, III, "Financial Lease Evaluation: Survey and Synthesis," paper presented at the Eastern Finance Association meeting, Storrs, CN, April 12, 1973, pp. 2-3.

Equation (6), much will depend on the relative magnitudes of r, r_l, and k_t.

Vancil's original objective in neutralizing the financial element in Equation (9) was "to eliminate the difference in the amount of financing provided when comparing specific proposals."[1] However, several authors have pointed out that Vancil's use of the equivalent loan device overcomes a more important criticism of the conventional lease versus borrow model.[2] Since leasing typically provides more financing than debt, the firm will face higher fixed charges with the lease alternative than with the debt alternative.[3] These higher fixed charges will raise the financial risk of the firm and may cause investors to increase the required rate of return on the firm's securities.[4] This "capital structure effect" becomes an implicit cost of lease financing. The use of the equivalent loan comes very close to holding financial risk constant in comparisons between lease and purchase cash flows. The entry of the "equivalent interest" tax shield as a negative number in Equation (9) is, in effect, an offset against the impact of the lease on the overall cost of capital of the firm.[5]

At this point it may be useful to introduce a numerical example in order to make explicit the differences between Vancil's model and the conventional methodology. The example which appears in Johnson and

---

[1]Vancil, "New Method," p. 89.

[2]See, for example, Mao, pp. 328-29; Findlay, pp. 1a-1b; and Bower, p. 30.

[3]Mao, p. 328. [4]Van Horne, pp. 220-44.

[5]Findlay, p. 1a; and Bower, p. 30.

Lewellen's well-known article will be used for this purpose.[1] It will be particularly convenient to employ the Johnson and Lewellen figures since this example was used to construct Vancil's equivalent loan in Table 1.

Johnson and Lewellen assume the following values:

A_o = \$15,000 r = 8 percent

R_i = \$4,200 t = 50 percent

n = 5 years k_t = 12 percent

The lease is assumed to have a term of 5 years. If the asset is purchased, it will be fully depreciated over its useful economic life using the sum of the years' digits method. The depreciation schedule is shown as Table 2. All cash flows, with the exception of the purchase price, are assumed to occur at the end of each year. An amortization for a five-year 8 percent bank term loan of \$15,000 is given as Table 3.

TABLE 2

DEPRECIATION SCHEDULE FOR THE JOHNSON AND LEWELLEN EXAMPLE

End of Year	Depreciation Expense
1	\$ 5,000
2	4,000
3	3,000
4	2,000
5	1,000
	\$15,000

[1] Johnson and Lewellen, "Lease-or-Buy," p. 820.

TABLE 3

TERM LOAN AMORTIZATION SCHEDULE FOR THE JOHNSON AND LEWELLEN EXAMPLE

End of Year	Installment Payment	Interest	Principal Repayment	Remaining Balance
1	$ 3,757	$1,200	$ 2,557	$12,443
2	3,757	995	2,762	9,681
3	3,757	774	2,983	6,698
4	3,757	536	3,221	3,477
5	3,757	280	3,477	
	$18,785	$3,785	$15,000	

The Johnson and Lewellen example assumes values for two additional variables which are not included in the conventional model of Equation (6) or Vancil's Equation (9). First, a pre-tax salvage value of $1,500 is assumed at the end of the fifth year. It is further assumed that the tax rate applicable to gains and losses on the disposal of fixed assets is 30 percent. As such, the after-tax salvage value is calculated as follows:

$$V_n = S_n - t_g(S_n - B_n)$$

where V_n = after-tax salvage at the end of year n,

S_n = pre-tax salvage at the end of year n,

t_g = tax rate applicable to gains and losses on fixed assets, and

B_n = book value at the end of year n.

For the Johnson and Lewellen problem, pre-tax salvage is $1,050:

$$V_n = \$1,050 = \$1,500 - .30(\$1,500 - 0).$$

The second variable assumed by Johnson and Lewellen is O_i, the pre-tax operating costs expected to occur in year i if the asset is purchased, but not if it is leased. This arises because the example assumes the lessor will pay a portion of the asset's operating costs. Thus, O_i represents costs which will be avoided if the asset is leased. These costs are assumed to be $1,000 per year over the term of the lease.

To facilitate comparisons with models which will be presented later in the chapter, these additional variables will be added to Equations (6) and (9). In each case, their treatment will be consistent with the theoretical framework of the model. For example, in a subsequent article, Vancil indicated that after-tax salvage value should be discounted at k_t because it is "not contractual in nature."[1] Following a similar line of reasoning, it is assumed that Vancil would discount the after-tax operating costs avoided by leasing at the same rate, since these too are non-contractual cash flows. This treatment of O_i is reinforced by the fact that Vancil discounts all of the tax shields at k_t, despite the fact that these are not risky operating flows.

With the addition of these two variables, Equation (9) would look as follows:

$$NAL = A_o - \sum_{i=1}^{n} \frac{R_i}{(1+r)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+k_t)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1+k_t)^i}$$

$$- \sum_{i=1}^{n} \frac{tI'_i}{(1+k_t)^i} + \sum_{i=1}^{n} \frac{O_i(1-t)}{(1+k_t)^i} - \frac{V_n}{(1+k_t)^n} \qquad (9')$$

---

[1] Vancil, "Steps in Negotiation," p. 95.

The present value of the after-tax operating savings associated with the lease enters as a positive number, since these savings are a benefit of leasing. The present value of after-tax salvage, on the other hand, enters as a negative number, since this is a benefit which is foregone by leasing.

Applying this equation to the Johnson and Lewellen example, we find that the net present value advantage of leasing is a negative $143:

$$- \$143 = \$15{,}000 - \$16{,}769 - \$5{,}813 + \$7{,}570 - \$1{,}337 + \$1{,}802 - \$596 \qquad (9')$$

In other words, the Basic Interest Rate method favors the purchase alternative for this particular numerical example.

In a similar manner, Equation (6) may be adjusted to account for operating savings and salvage value:

$$NAL = \sum_{i=1}^{n} \frac{L_i}{(1+k_t)^i} - \sum_{i=1}^{n} \frac{R_i}{(1+k_t)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+k_t)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1+k_t)^i}$$

$$- \sum_{i=1}^{n} \frac{tI_i}{(1+k_t)^i} + \sum_{i=1}^{n} \frac{O_i(1-t)}{(1+k_t)^i} - \frac{V_n}{(1+k_t)^n} \qquad (6")$$

Both $O_i(1 - t)$ and V_n have been discounted at k_t in keeping with the conventional methodology's use of a single discount rate for all cash flows. The terms of Equation (6") have been rearranged to facilitate comparisons with Equation (9').

Application of the conventional model's equation to the numerical example results in a net present value advantage to leasing of a negative $92:

$$- \$92 = \$13,543 - \$15,140 - \$5,813 + \$7,570 - \$1,458 + \$1,802 - \$596 \quad (6")$$

Once again, the purchase is the preferred alternative for the Johnson and Lewellen example.

A comparison of the present values of the components of Equations (9') and (6") indicates that they differ with respect to only three terms. First, the initial term in Equation (6") is the present value of the loan payments discounted at k_t, whereas the comparable term in Equation (9') is the purchase price of the asset. This difference is accounted for by the fact that Equation (6") assumes the purchase is financed with 100 percent debt, while the BIR method of Equation (9') assumes a "cash purchase."[1]

The second difference concerns the present value of the lease payments in each equation. Vancil's model discounts the annual lease payments at the debt rate in order to penalize the lease for its higher implicit interest charge. This results in a present value of $16,769. In Equation (6") the lease payments are discounted at k_t, resulting in a present value of $15,140. Note that this present value closely approximates the purchase price of $15,000. The reason for this is that k_t is very close to r_l (12 percent versus 12.38 percent).

The final difference in the two methods concerns the calculation of the interest tax shield. In Equation (6") the interest expense is calculated under the assumption that the purchase will be financed with an 8 percent bank loan in the principal amount of $15,000. The interest expense from Table 3 provides the tax shelter which enters Equation (6").

---

[1]Vancil, "New Method," p. 87.

The interest tax shield in Equation (9'), on the other hand, is an "equivalent interest" tax shelter and is provided by the "interest" calculated in Table 1. The present value of the equivalent interest tax shield is $121 less than the shield calculated under the conventional borrow-and-buy assumption.

These various differences tend to net out, so that the net present value advantage of the lease generated by the two models is very close, and the decision in favor of purchase is the same. It is likely that under normal lease versus purchase assumptions, both models will lead to the same decision.

Criticisms of the conventional and BIR models. Two important criticisms of the conventional methodology have already been discussed. Both relate to the fact that different amounts of financing are involved in the lease and purchase alternatives. The first concerns Vancil's original argument that the differential financing element should be eliminated from the analysis because alternative sources of funds are available to the firm. The second points out that Vancil's attempt to neutralize the implicit debt financing of the lease adjusts for the impact of the higher fixed charges of leasing on the firm's cost of capital.

Two other important criticisms apply to both the conventional method and the Vancil model. The most significant relates to the fact that both models discount relatively risk-free cash flows at the firm's weighted average cost of capital. The use of k_t as a discount rate is only appropriate for cash flows with risk characteristics equal to the risk of the average investment cash flows of the firm. This is because

k_t "embodies a risk premium for the firm as a whole."[1] As such, k_t should not be applied to cash streams which are nearly risk free.

The conventional model is perhaps the worst offender in this respect since it discounts all cash flows at the cost of capital. These include the contractual flows represented by the loan and lease payments as well as all of the tax shields. The contractual flows are relatively riskless since they represent legal obligations of the firm which must be paid in order to avoid bankruptcy.[2] Similarly, the tax shields provided by depreciation, interest, and lease expense are highly certain streams, representing, in effect, financial transactions with the government.[3] The major source of risk associated with these particular tax shields is political in nature and would result from a change in the corporate income tax rate.[4]

A similar criticism applies to Vancil's use of k_t as the discount rate for the tax savings of Equation (9). However, his use of r as the rate of discount for the lease expense is, in effect, an adjustment for the relative certainty of this payment stream. Although his discussion of this point is somewhat ambiguous, it is clear that this was not Vancil's original intention. As discussed previously, the use of r as the discount rate for R_i is designed to penalize the lease for having an implicit interest rate which exceeds the BIR.[5]

---

[1] Van Horne, 3rd ed., p. 588.

[2] Weston and Brigham, 5th ed., p. 480n. [3] Findlay, p. 2.

[4] A discussion of the appropriate discount rates for $O_i(1 - t)$ and V_n will be deferred to a later section since these variables were not included in the original models.

[5] Vancil, "New Method," p. 90.

The second criticism which applies to both the conventional and BIR methods is that they view the lease-purchase analysis as a pure financing decision. In other words, it is assumed that a previous investment analysis has determined that a purchase of the asset is profitable from a capital budgeting standpoint. As Vancil states:

> The first step in the analysis of financial leases . . . is to compare the alternative of purchasing the equipment for cash with the alternative of continuing the status quo. This is another routine investment decision. If purchase does not appear desirable, a financial lease will probably not be desirable either. . . .
>
> Thus, the consideration of a financial lease should begin only after a company has previously decided that the purchase of a piece of equipment is desirable.[1]

That is, the analysis models of Equations (6) and (9) are designed to determine the lowest cost method of financing the transaction and are not concerned with the decision to acquire the use of the asset.

This separation of the acquisition and leasing decision has been criticized by Johnson and Lewellen who point out that:

> If one unhinges the two, one can never allow a very attractive lease to reverse an original negative purchase decision; indeed, the lease analysis would never be undertaken if the NPV of purchase were unattractive.[2]

They go on to note that "almost any asset is acceptable at some sufficiently low price, even if that low price happens to take the form of a lease arrangement."[3] Thus, Johnson and Lewellen conclude that the lease alternative is inextricably linked to the acquisition decision and is not a separate, purely financial, decision.[4]

In fairness to Vancil, it should be pointed out that he recognizes the possibility that an extremely low rate lease might be

---

[1] Ibid., p. 86. [2] Johnson and Lewellen, "Reply," p. 1025.

[3] Ibid. [4] Ibid.

attractive when a purchase proves to be unprofitable. However, he considers this to be a "highly unusual case,"[1] and his Basic Interest Rate method makes no provision for such an eventuality.

A final criticism of the Basic Interest Rate approach concerns Vancil's method of constructing the equivalent loan. It will be recalled that Vancil's loan is for a principal amount equal to the purchase price of the asset and that the assumed interest rate is r, the firm's pre-tax cost of debt capital. As shown in Table 1, the use of the annual lease expense as the repayment of interest and principal leads to an "over-amortization" of principal when $r_l > r$. One may reasonably ask if a loan constructed in this fashion is really "equivalent" to the lease and if the interest tax shield generated by such a loan is the appropriate "equivalent interest" cash flow. This same question was asked by Bower, Herringer, and Williamson when they developed an alternative lease versus purchase model in 1966.[2] Bower et al. construct a loan equivalent which is amortized at the same proportional rate as the lease, in the belief that "the proper assumption is that a lease payment schedule of any configuration [should be] matched by a loan or series of loans with the same configuration."[3] The actual method of constructing this equivalent loan will be covered in the following section.

---

[1] Vancil, "New Method," p. 86.

[2] Richard S. Bower, Frank C. Herringer, and J. Peter Williamson, "Lease Evaluation," Accounting Review 41 (April 1966): 257-65.

[3] Ibid., p. 260.

The Bower, Herringer, and Williamson model

Mathematically, the Bower, Herringer, and Williamson (BHW) model is virtually identical to the expanded version of the BIR method given by Equation (9'). The only difference lies in the calculation of the equivalent interest tax shield. This is represented by the double primes on the fifth term on the right hand side of the BHW formulation:[1]

$$NAL = A_o - \sum_{i=1}^{n} \frac{R_i}{(1+r)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+k_t)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1+k_t)^i}$$

$$- \sum_{i=1}^{n} \frac{tI_i''}{(1+k_t)^i} + \sum_{i=1}^{n} \frac{O_i(1-t)}{(1+k_t)^i} - \frac{V_n}{(1+k_t)^n} \qquad (10)$$

Both $O_i(1 - t)$ and V_n are included in the original presentation of this model, and both are discounted at k_t.[2]

Despite the mathematical similarity of the two models, the conceptual-theoretical approach of Bower and his colleagues is quite different from that of Vancil. For example, BHW are the first to relate the lease or purchase decision to the objective of maximizing shareholder wealth.[3] As such, they do not talk in terms of the "cost"

---

[1]It is interesting to note that Bower, Herringer, and Williamson were the first to express their model in semiequation form. The other models which have been discussed up to this point have been converted from tabular to equation form for the purposes of comparability.

[2]BHW apply the ordinary income tax rate t to pre-tax salvage value. Thus far t_g has been used as the tax rate applicable to gains and losses on the disposal of fixed assets. The latter is the more general form since it allows for the possibility that t may not equal t_g. See, Johnson and Lewellen, "Lease-or-Buy," p. 819n.

[3]Modern financial theory is premised on the assumption that the objective of the firm is to maximize shareholder wealth. See, for example, Ezra Solomon, The Theory of Financial Management (New York: Columbia University Press, 1963), pp. 15-25; James T. S. Porterfield,

of the lease alternative but rather in terms of "how the market value of the firm will be affected by the lease choice."[1]

In addition, their use of r as the discount rate for the lease payments is a recognition of the greater certainty of this contractual cash flow. This is reinforced by the fact that BHW do not employ the term "lessor's premium" in describing the difference between the first two terms of Equation (10):

$$A_o - \sum_{i=1}^{n} \frac{R_i}{(1 + r)^i} \tag{11}$$

BHW refer to this as the financial advantage or disadvantage of the lease and state that it represents the difference between "the market value of the lease and the loan that could replace it."[2] Their use of the term "market value" implies that investors recognize the greater certainty of the lease payment stream and apply a lower discount rate to this flow in valuing the firm. They go on to state that:

> The rates k_t and r and the optimal mix of debt and equity are related to the risk in the firm's flows. If leasing changes this risk, . . . then lease and loan alternatives can be evaluated using different rates.[3]

Thus, we see for the first time a recognition of the fact that the differential risk of the cash flows involved in the leasing analysis require the use of different risk-adjusted discount rates. It may be

---

Investment Decisions and Capital Costs (Englewood Cliffs, NJ: Prentice-Hall, 1965), pp. 5-19; and Van Horne, 3rd ed., pp. 6-9.

[1]Bower, Herringer, and Williamson, p. 259.

[2]Ibid. The authors assume that the equivalent loan is for principal amount A_o.

[3]Ibid., pp. 259-60.

said that this recognition stems directly from their use of shareholder wealth maximization as the objective of the firm, and it underscores the dependence of normative theory on a precise specification of goals.

Unfortunately, Bower, Herringer, and Williamson do not recognize that the tax shields generated by the lease and purchase alternatives are also highly certain flows. They take the same approach as Vancil in discounting these flows at k_t. Similarly, it has been argued that the operating expenses assumed by the lessor "are fixed charges subject to little or no uncertainty,"[1] and should, therefore, be discounted at a relatively low rate.[2] On the other hand, V_n is a random variable subject to a great deal of uncertainty. Thus, a discount rate in the vicinity of k_t may be justified in the case of after-tax salvage.

The important computational difference between the Vancil and BHW models concerns the calculation of the equivalent interest tax shield. As stated previously, BHW's equivalent loan has payments which are proportional to the lease expense in each period. The proportion is equal to the purchase price of the asset (the required loan) divided by the present value of the lease payments. Thus, the repayment of principal and interest in each period would be calculated as follows:

$$L_i'' = R_i[(A_o)/(J_o)] \tag{12}$$

where L_i'' = BHW's equivalent loan payments, and

$$J_o = \sum_{i=1}^{n} \frac{R_i}{(1 + r)^i}$$

---

[1] Gordon, p. 247.

[2] A similar and somewhat more complex argument has been made by Findlay, p. 4, and will be discussed in a later section.

This method of constructing the equivalent loan avoids the problem of over-amortization. Table 4 demonstrates the BHW method using the Johnson and Lewellen example. It is interesting to note that the loan constructed in Table 4 is identical to the term loan of Table 3. This results because of the assumption of level lease and debt payments and the assumption that both payments are made at the same time during the year. As long as these two assumptions hold, the BHW method will generate an interest tax shield which is equal to the one assumed by the conventional model.

TABLE 4

AMORTIZATION SCHEDULE FOR BHW'S EQUIVALENT LOAN

End of Year	R_i Lease Payments	L_i'' "Loan" Payments	I_i'' "Interest"	Q_i'' "Principal" Repayment	P_i'' Remaining Balance
0	---	---	---	---	$15,000
1	$ 4,200	$ 3,757	$1,200	$ 2,557	12,443
2	4,200	3,757	995	2,762	9,681
3	4,200	3,757	774	2,983	6,698
4	4,200	3,757	536	3,221	3,477
5	4,200	3,757	280	3,477	
	$21,000	$18,785	$3,785	$15,000	

Substituting the previously calculated values from Equation (6") and (9') into Equation (10), we find that the BHW model gives an NAL of -$264 for the Johnson and Lewellen example:

$$-\$264 = \$15,000 - \$16,769 - \$5,813 + \$7,570 - \$1,458 + \$1,802 - \$596 \qquad (10)$$

This amount is $121 less than the net present value advantage of the lease given by the BIR equation. The total difference is accounted for by the larger interest shield generated by BHW's equivalent loan. For a given lease-purchase analysis, the BHW method will be less favorable to the lease as long as $r_l > r$. When $r_l = r$, the two methods will give identical results, and when $r_l < r$ the BHW method will be more favorable to the lease than Vancil's method.

The Bierman and Smidt model

All of the models presented thus far fail to adjust for the relative certainty of the tax shields generated by the lease and purchase options. The first model to make this adjustment was presented by Bierman and Smidt in the second edition of their well-known work, The Capital Budgeting Decision.[1] Bierman and Smidt view the lease-purchase analysis as a financing decision in which all cash flows are discounted at the after-tax cost of debt. They point out that

> the main justification for treating these financial cash flows as essentially certain . . . is that their amounts and timing are largely determined by legal contracts that the firm acquiring the asset will have to fulfill. The lease contract determines the amounts and timing of the lease payments; the debt contract determines the amounts and timing of the debt repayments. . . . The depreciation expense charges allowed for tax purposes are not contractual, but they are fixed by law and in the presence of a large amount of other income and stable tax rates are reasonably certain.[2]

The Bierman and Smidt model is a borrow versus lease analysis. That is, the decision is between financing the acquisition of the asset

---

[1] Harold Bierman, Jr. and Seymour Smidt, The Capital Budgeting Decision, 2nd ed. (New York: Macmillan Co., 1966), pp. 218-27.

[2] Ibid., p. 255 (Italics added).

with a lease or with a term loan equal to the purchase price of the asset. Thus, the net present value cost of the debt alternative is equal to the present value of the after-tax loan payments less the present value of the tax shield provided by the depreciation expense:

$$NPVC(D) = \sum_{i=1}^{n} \frac{Q_i}{(1+r_t)^i} + \sum_{i=1}^{n} \frac{(1-t)I_i}{(1+r_t)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+r_t)^i} \tag{13}$$

where $r_t = (1 - t)r$. Note that the loan payments have been broken down into a principal repayment component Q_i and an after-tax interest component $(1 - t)I_i$. This is because the after-tax debt rate is used to discount these flows. It can be shown that discounting Q_i and $(1 - t)I_i$ at r_t is equivalent to discounting the pre-tax loan payments L_i at r. This, of course, is equal to the principal of the loan A_o. Thus, the first two terms of Equation (13) reduce to the purchase price of the asset:

$$\sum_{i=1}^{n} \frac{Q_i}{(1+r_t)^i} + \sum_{i=1}^{n} \frac{(1-t)I_i}{(1+r_t)^i} = \sum_{i=1}^{n} \frac{L_i}{(1+r)^i} = A_o \tag{14}$$

and Equation (13) becomes

$$NPVC(D) = A_o - \sum_{i=1}^{n} \frac{tD_i}{(1+r_t)^i} \tag{13'}$$

Bierman and Smidt calculate the net present value cost of the lease as the present value of the after-tax lease payments:

$$NPVC(L) = \sum_{i=1}^{n} \frac{R_i}{(1+r_t)^i} - \sum_{i=1}^{n} \frac{tR_i}{(1+r_t)^i} \tag{15}$$

where both flows are discounted at r_t to adjust for their relative certainty.

The net present value advantage of the lease is determined by subtracting Equation (15) from Equation (13'):

$$NAL = A_o - \sum_{i=1}^{n} \frac{R_i}{(1+r_t)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+r_t)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1+r_t)^i} \qquad (16)$$

where the terms have been rearranged to facilitate comparisons with other lease analysis models.

A unique feature of the Bierman and Smidt method is their recommendation that an investment analysis be performed after the borrow versus lease analysis has been completed. As in the case of the models which have been discussed previously, Bierman and Smidt separate the acquisition and financing decisions. However, unlike the previous models, they perform the capital budgeting analysis under the assumption that the lowest cost method will be used to finance the investment. This use of an ex post investment analysis overcomes Johnson and Lewellen's criticism that prior justification of the acquisition on an ownership basis can never allow a bargain lease opportunity to reverse an initially unfavorable purchase decision.[1]

Bierman and Smidt's model makes an important contribution to the development of lease purchase analysis methodologies. Their use of a risk-adjusted rate to discount the tax shields represents an important conceptual breakthrough in this field. Without exception, subsequent net present value models have attempted to adjust for the degree of risk associated with each of the cash flows. For example, in the 1969 and 1972 editions of Managerial Finance, Weston and Brigham altered their original model by discounting all of the contractual and tax

[1]Johnson and Lewellen, "Reply," p. 1025.

savings flows at the after-tax debt rate.[1] Some of the more interesting aspects of Weston and Brigham's revised model will be discussed in the following section.

The Weston and Brigham model (1972)

The lease analysis model which appears in the fourth edition of Managerial Finance is an important methodological technique.[2] Because of the widespread use of the Weston and Brigham text, it is one of the best-known of the contemporary models. As we have seen, however, its theoretical base is firmly rooted in the conventional methodology developed by Cohen in 1953.[3] In addition, it can be demonstrated that Weston and Brigham's revised model is conceptually equivalent to both the Bierman and Smidt and the Johnson and Lewellen approaches.

The major difference between the revised Weston and Brigham model and the earlier version given by Equation (6) is that r_t has replaced the cost of capital as the discount rate in order to adjust for the "relative certainty" of the cash flows.[4] The other change is that V_n and O_i have been added to the equation:

---

[1] J. Fred Weston and Eugene F. Brigham, Managerial Finance, 3rd ed. (New York: Holt, Rinehart and Winston, 1969), pp. 533-37; and Weston and Brigham, 4th ed., pp. 462-68.

[2] Weston and Brigham, 4th ed., pp. 462-68. The same model appeared in the third edition of Managerial Finance; however, the discussion will be confined to the 1972 presentation.

[3] Cohen, "Long-Term Net Leasing," pp. 137-58.

[4] Weston and Brigham, 4th ed., p. 464.

$$NAL = \sum_{i=1}^{n} \frac{L_i}{(1+r_t)^i} - \sum_{i=1}^{n} \frac{R_i}{(1+r_t)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+r_t)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1+r_t)^i}$$

$$- \sum_{i=1}^{n} \frac{tI_i}{(1+r_t)^i} + \sum_{i=1}^{n} \frac{O_i(1-t)}{(1+r_t)^i} - \frac{V_n}{(1+k_t)^n} \qquad (17)$$

Note that only the after-tax salvage value is discounted at k_t. This is because Weston and Brigham assume that salvage "is about as risky as the firm's average asset."[1]

If we ignore for the moment the trivial difference that Weston and Brigham include V_n and O_i in their equation and Bierman and Smidt do not, it is a simple procedure to show that the two models are equivalent. Bierman and Smidt's Equation (16) may be rewritten as follows:

$$NAL = \sum_{i=1}^{n} \frac{Q_i}{(1+r_t)^i} + \sum_{i=1}^{n} \frac{(1-t)I_i}{(1+r_t)^i} - \sum_{i=1}^{n} \frac{R_i}{(1+r_t)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+r_t)^i}$$

$$+ \sum_{i=1}^{n} \frac{tR_i}{(1+r_t)^i} \qquad (16')$$

since by expression (14):

$$\sum_{i=1}^{n} \frac{Q_i}{(1+r_t)^i} + \sum_{i=1}^{n} \frac{(1-t)I_i}{(1+r_t)^i} = A_o \qquad (14)$$

However, recognizing that

$$\sum_{i=1}^{n} \frac{Q_i}{(1+r_t)^i} + \sum_{i=1}^{n} \frac{(1-t)I_i}{(1+r_t)^i} = \sum_{i=1}^{n} \frac{L_i}{(1+r_t)^i} - \sum_{i=1}^{n} \frac{tI_i}{(1+r_t)^i} \qquad (18)$$

---

[1] Ibid., p. 464n.

and substituting into Equation (16') and rearranging, we may write the Bierman and Smidt model as:

$$NAL = \sum_{i=1}^{n} \frac{L_i}{(1+r_t)^i} - \sum_{i=1}^{n} \frac{R_i}{(1+r_t)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+r_t)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1+r_t)^i}$$

$$- \sum_{i=1}^{n} \frac{tI_i}{(1+r_t)^i} \qquad (16")$$

In this form it may be seen that Bierman and Smidt's approach is identical to Weston and Brigham's Equation (17). The only difference is that Weston and Brigham recognize the existence of salvage value and allow for the possibility of operating costs which are covered by the lessor.

There is another difference between the models, however, which relates to the separation of the acquisition and financing decision. Both methods treat the problem as a financing decision. As Weston and Brigham point out, the decision to acquire the asset is not at issue in their analysis. They assume that "this decision was made <u>previously</u> as part of the capital budgeting process."[1] An ex ante investment analysis, however, requires knowledge of the method of acquiring the asset's services (lease or purchase). As was pointed out previously, it is common to assume that the asset will be purchased for the purposes of the investment decision, and this approach may lead the firm to reject a particularly attractive lease. The Bierman and Smidt method of determining the asset's investment worthiness after the lease or buy

---

[1] Ibid., p. 462 (italics added).

decision has been made is clearly the preferred approach if the investment and financing decisions are to be separated.[1]

For purposes of comparison, the revised Weston and Brigham model may be applied to the Johnson and Lewellen example. The calculations for Equation (17) are as follows:

$$\$429 = \$16,725 - \$18,698 - \$6,852 + \$9,349 - \$1,725 + \$2,226 - \$596 \quad (17)$$

It should be noted that this is the first model investigated to generate a positive NAL for the Johnson and Lewellen problem.[2] A summary of the net present value advantage of leasing generated by each of the models is shown as Table 5. The major reason for the reversal of sign in favor of leasing is the use of the lower discount rate in the Weston and Brigham equation. Since the benefits of leasing exceed the "costs" of leasing in the later years of the asset's life, the use of a lower rate of discount tends to give additional weight to these benefits. The result is a decision in favor of the lease alternative.

A second, more controversial, model which also tends to favor the lease option has been developed by Johnson and Lewellen. A detailed analysis of this approach follows.

---

[1] It should be pointed out that a number of contemporary theorists believe the financing and investment decisions should not be separated. This issue will be discussed in a later section.

[2] Expansion of the Bierman and Smidt model to include V_n and O_i would, of course, generate an identical NAL.

TABLE 5

NET PRESENT VALUE ADVANTAGE OF LEASING GENERATED BY FOUR LEASE ANALYSIS MODELS

Model	NAL
Conventional Model	-$92
Basic Interest Rate Model	-$143
Bower, Herringer, Williamson Model	-$264
Weston and Brigham Model (1972)	+$429

The Johnson and Lewellen model

The Johnson and Lewellen model makes clear the fact that one's conceptual definition of leasing is a major determinant of one's analysis method. Until now, all the approaches we have considered view the lease analysis as a financing decision. Johnson and Lewellen, on the other hand, view lease versus purchase as an investment decision. The result is a model which, at least on the surface, is quite different from its predecessors.

Johnson and Lewellen build their model on the assumption that the normative framework of capital budgeting provides the appropriate theoretical base for lease-purchase decisions. They argue that a lease contract is simply "a long-term acquisition-of-services arrangement which differs in time profile but not in financing impact from the alternative . . . we call 'purchase.'"[1] They go on to state that

> just as the purchase price of the equipment involved would be regarded as an outlay to be financed by some long-term package of debt and equity funds, so should the obligations under the lease. The fact that the relevant payments are spread out over a period of years rather than being

[1] Johnson and Lewellen, "Lease-or-Buy," p. 816.

> concentrated in an immediate lump sum does not justify a difference in the principle of their treatment, nor in one's view of the implicit composition of their financing.[1]

This view of a lease as something to be financed rather than as a source of financing is the major conceptual difference between Johnson and Lewellen and previous theorists. It leads them to conclude that the addition of any form of interest charge or interest tax shield to the cash flows is incorrect because it is "inconsistent with the general normative framework for capital budgeting."[2] They point out that received doctrine in capital budgeting recommends the use of a composite cost of capital to discount all cash flows associated with an investment. Since this discount rate includes the explicit finance charges related to dividend and interest payments (as well as implicit charges connected with the risks borne by the shareholders), the inclusion of financing charges would involve double-counting.[3]

Johnson and Lewellen's lease analysis model is derived from two equations which are expressed in the traditional capital budgeting framework. Equation (19) defines the net present value of the purchase:

$$NPV(P) = \sum_{i=1}^{n} \frac{(Z_i - C_i) - t(Z_i - C_i - D_i)}{(1 + k_t)^i} + \frac{S_n - t_g(S_n - B_n)}{(1 + k_t)^n} - A_o \qquad (19)$$

where Z_i = expected cash revenues generated by the asset in year i,

C_i = pre-tax cash operating costs expected to be required to operate the asset in year i if it is purchased,

and all other variables are defined as before. Equation (19) is the familiar capital budgeting equation with the firm's after-tax cost of

---

[1] Ibid. [2] Ibid., p. 817. [3] Ibid., p. 815.

capital as the discount rate.[1] Note that, in keeping with the above discussion, no financing charges are included in the equation.

In a similar fashion, Johnson and Lewellen define the net present value of the lease option:

$$NPV(L) = \sum_{i=1}^{n} \frac{[Z_i - (C_i - O_i)](1 - t)}{(1 + k_t)^i} - \sum_{i=1}^{n} \frac{R_i}{(1 + r_t)^i}$$

$$+ \sum_{i=1}^{n} \frac{tR_i}{(1 + r_t)^i} \qquad (20)$$

where $C_i - O_i$ = pre-tax cash operating costs expected in year i if the asset is leased and all other variables are defined as before. Equation (20) is nothing more than the capital budgeting framework applied to the leasing option, the only alteration being the use of r_t to discount the lease payments and their tax shields. Johnson and Lewellen justify this deviation from conventional theory on the basis of the greater certainty of the contractual lease payments.

Subtracting Equation (19) from Equation (20), we derive the expression for the net present value advantage of the lease:[2]

$$NAL = NPV(L) - NPV(P)$$

$$NAL = A_o - \sum_{i=1}^{n} \frac{R_i}{(1 + r_t)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1 + k_t)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1 + r_t)^i}$$

$$+ \sum_{i=1}^{n} \frac{O_i(1 - t)}{(1 + k_t)^i} - \frac{V_n}{(1 + k_t)^n} \qquad (21)$$

---

[1] Johnson and Lewellen exclude working capital outlays and recoveries under the assumption that they are symmetrical as between lease and purchase.

[2] It should be pointed out that Johnson and Lewellen express

where V_n has been substituted for $S_n - t_g(S_n - B_n)$. Note that several of the cash flows drop from the equation because they are common to both sides of the comparison. Since these flows involve the revenue generated by the asset and the operating costs associated with purchase, Equation (21) is insufficient by itself to make the lease-purchase decision. This is because when NPV(P) and NPV(L) are less than zero, Equation (21) will favor one of the alternatives even though they both generate negative present values. The decision will be in favor of leasing when $|NPV(P)| > |NPV(L)|$ and will be in favor of purchase when $|NPV(P)| < |NPV(L)|$.[1]

As a result, Johnson and Lewellen view Equation (21) as the second step in the lease-purchase analysis.[2] The first step is the calculation of the net present value of the purchase as a straight investment.[3] If the purchase appears to be unprofitable because $NPV(P) < 0$, the second step of calculating NAL must still be taken since it is possible that $NPV(L) > 0$. In this way Johnson and Lewellen allow for the existence of unusually attractive lease terms that are sufficient to reverse an initial negative purchase decision.[4]

Equation (21) in terms of the net present value advantage of the purchase rather than the lease. This has been reversed here for comparison with other models.

[1]Baruch Lev and Yair E. Orgler, "Analysis of the Lease-or-Buy Decision: Comment," Journal of Finance 28 (September 1973), p. 1023.

[2]Johnson and Lewellen, "Lease-or-Buy," p. 822; and Johnson and Lewellen, "Reply," pp. 1027-28.

[3]Johnson and Lewellen point out that this would involve the use of Equation (19) with the inclusion of working capital outlays and recoveries. See, Johnson and Lewellen, "Reply," p. 1028n.

[4]Johnson and Lewellen, "Lease-or-Buy," p. 822.

Criticisms of the Johnson and Lewellen model. The Johnson and Lewellen approach to the lease-purchase decision has created a great deal of controversy. Indeed, after the publication of their article, the Journal of Finance received 19 "Comments" on the methodology. Four of these were eventually published along with Johnson and Lewellen's "Reply" in the September 1973 issue.[1] Subsequent articles by a number of financial theorists have also taken issue with Johnson and Lewellen.[2]

Disagreement with their approach centers on two issues. The first is the premise that a lease is simply "a long-term acquisition-of-services arrangement"[3] which does not differ in financing impact from a purchase. The major practical implication of this position is the exclusion of an interest tax shield from Equation (21). The second major point of disagreement is Johnson and Lewellen's use of the cost of capital to discount seemingly riskless cash flows. Of particular concern to critics is the use of k_t to discount the depreciation tax shield, although Findlay also takes issue with the use of k_t to discount $O_i(1 - t)$.[4]

Johnson and Lewellen's position that a lease is merely an acquisition-of-services contract lies at the heart of their approach

---

[1]Robert A. Clark, Joan N. Jantorni, and Robert R. Gann, "Analysis of the Lease-or-Buy Decision: Comment," Journal of Finance 28 (September 1973): 1015-16; Peter Lusztig, "Analysis of the Lease-or-Buy Decision: Comment," Journal of Finance 28 (September 1973): 1017-18; Harold Bierman, Jr., "Analysis of the Lease-or-Buy Decision: Comment," Journal of Finance 28 (September 1973): 1019-21; and Lev and Orgler, pp. 1022-23.

[2]See, for example, Findlay, pp. 4-6; Bower, "Issues in Lease Financing," pp. 29-30; Schall, "Lease-or-Buy," p. 1211; and Nantell, "Lessor's Pricing," pp. 5-9.

[3]Johnson and Lewellen, "Lease-or-Buy," p. 816. [4]Findlay, p. 6.

to lease-purchase analysis. In essence, they deny the "capital structure effect" of leasing discussed earlier in the chapter. That is, they do not believe that a firm's contractual commitments to make lease payments are viewed by investors as equivalent to long-term debt commitments.[1] Hence, they do not accept the view that shareholders perceive greater risk with leases which, in turn, causes them to raise the firm's equity capitalization rate.

Financial theorists have had difficulty accepting Johnson and Lewellen's position. Lease commitments do not differ substantially from interest and principal repayments under debt obligations. Since default on a lease contract may just as surely force a cessation of operations as default on a debt instrument, it seems reasonable to conclude that investors view leasing as a debt-surrogate. This position is at least partially reinforced by the empirical data of Vancil and Anthony.[2] Moreover, Johnson and Lewellen provide no solid theoretical or empirical evidence in support of their position. One is asked to accept their acquisition-of-services view of leasing merely as an article of faith.

It appears that Johnson and Lewellen's position on this issue stems from a misunderstanding of the equivalent loan device used by many lease analysis models. In their "Reply" article they state that "the designation of full debt financing as the acquisition alternative to leasing clearly attaches one form of finance to one asset."[3] They correctly point out that this approach "has been refuted . . . by every major writer in corporate finance during the last 20 years."[4] As a

---

[1]Johnson and Lewellen, "Reply," p. 1024. [2]Vancil and Anthony.

[3]Johnson and Lewellen, "Reply," p. 1024. [4]Ibid.

result, they argue for the exclusion of financing charges from the analysis under the mistaken impression that the inclusion of any interest-related cash flow implies a lease versus borrow analysis. While it is true that the methods we have reviewed in this chapter thus far take a lease-or-borrow perspective, it is not true that the entry of an interest tax-shield in the equation implies 100 percent debt financing of the purchase.[1] What Johnson and Lewellen fail to recognize is that the equivalent loan device seeks to neutralize the capital structure effect of leasing and does not necessarily attempt to associate a particular form of financing with the purchase alternative.[2]

As a result of this misunderstanding, Johnson and Lewellen opt for a capital budgeting approach which excludes all interest-related flows from the analysis. This "separation of the acquisition and leasing decisions,"[3] as they refer to it, is a means of overcoming the problems which they perceive in the lease-or-borrow models of their predecessors. As Findlay points out, however, the lease itself violates the separation theorem in that components of investment and financing are present in any decision to lease an asset.[4] Lev and Orgler agree with Findlay. They take the position that the lease-or-borrow approach

---

[1] Findlay, p. 1a.

[2] Johnson and Lewellen's misunderstanding of this point may be seen in their criticism of the Vancil and the Bower, Herringer, and Williamson models. They make it quite clear that they do not understand the reason for the inclusion of only the interest tax shield in these models and not the full interest charge on the loan. See, Johnson and Lewellen, "Lease-or-Buy," p. 817.

[3] Johnson and Lewellen, "Reply," p. 1025. [4] Findlay, pp. 1a-1b.

is reasonable "since the two alternatives . . . are equivalent from the point of view of financial risk."[1]

Whichever view is correct, the question becomes moot with regard to Johnson and Lewellen's model since it can be shown that Equation (21) implicitly assumes 100 percent debt financing of the purchase. Specifically, Johnson and Lewellen's model implies the loan which is explicit in Weston and Brigham's Equation (17). It is one of the ironies of the development of lease analysis models that Johnson and Lewellen's approach is found to be formally identical to a lease-or-borrow method.[2]

It is a simple procedure to show that Equation (21) implies the Weston and Brigham loan. From Equations (14) and (18) above, it is clear that

$$A_o = \sum_{i=1}^{n} \frac{L_i}{(1+r_t)^i} - \sum_{i=1}^{n} \frac{tI_i}{(1+r_t)^i} \qquad (22)$$

In other words, the purchase price of the asset is equal to the present value of the loan payments less the present value of the interest tax shield, where both are discounted at the after-tax debt rate. (Recall that in the Weston and Brigham method the loan is for principal amount A_o at interest rate $r = r_t/(1-t)$. Substituting the right hand side of Equation (22) into the Johnson and Lewellen formulation and rearranging terms:

---

[1] Lev and Orgler, p. 1023.

[2] This is particularly true in light of the fact that Johnson and Lewellen specifically criticize Weston and Brigham for assuming the purchase is financed with 100 percent debt. See, Johnson and Lewellen, "Lease-or-Buy," p. 817.

$$NAL = \sum_{i=1}^{n} \frac{L_i}{(1+r_t)^i} - \sum_{i=1}^{n} \frac{R_i}{(1+r_t)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+k_t)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1+r_t)^i}$$

$$- \sum_{i=1}^{n} \frac{tI_i}{(1+r_t)^i} + \sum_{i=1}^{n} \frac{O_i(1-t)}{(1+k_t)^i} - \frac{V_n}{(1+k_t)^n} \qquad (21')$$

it can be seen that Equation (21') is formally identical to Weston and Brigham's Equation (17).[1] The only difference between the two models is that Johnson and Lewellen discount tD_i and $O_i(1 - t)$ at k_t while Weston and Brigham discount these terms at r_t. Nantell argues that this is not a conceptual difference, however.[2] He points out that it is the objective of both methodologies to discount these flows at the "appropriate risk-adjusted rate."[3] The only real difference of opinion concerns the question of what this rate should be.

Although this difference of opinion does not constitute a conceptual difference, it is clearly a practical difference with regard to the net present value advantage of the lease. This may be seen when we apply Equations (17) and (21) to the Johnson and Lewellen example. Previously we determined that Weston and Brigham's Equation (17) generated an NAL of +$429. In comparison, Johnson and Lewellen's Equation (21) calculates the net advantage of the lease at +$1,044:

$$\$1,044 = \$15,000 - \$18,698 - \$5,813 + \$9,349 + \$1,802 - \$596 \qquad (21)$$

---

[1] A number of writers have pointed out that Johnson and Lewellen's method includes an implicit loan. See, for example, Findlay, p. 5; Bower, "Issues in Lease Financing," p. 30; and Nantell, "Lessor's Pricing," pp. 7-8.

[2] Nantell, "Lessor's Pricing," p. 8. [3] Ibid.

The total difference between the models of $615 is accounted for by the differential dsicount rates applied to tD_i and $O_i(1 - t)$.

It was pointed out at the beginning of this section that the second major criticism of Johnson and Lewellen concerns their use of k_t to discount these cash flows. Most critics are particularly concerned with the application of k_t to the depreciation tax shield.[1] They note that a firm which has sufficient other income or has available the use of carrybacks or carryforwards may treat the depreciation tax shield as essentially riskless and discount it at a relatively low rate. Johnson and Lewellen's position is further weakened by the fact that they discount the lease payments and the lease payments' tax shield at the after-tax debt rate. This appears to be totally inconsistent with their treatment of tD_i.

In their reply to these criticisms Johnson and Lewellen make two points. First, they protest that their critics look only at Equation (21) in isolation, without considering its origin. They point out that Equation (21) is derived from two equations which are constructed in accordance with received capital budgeting theory, and that such theory recommends the use of a composite cost of capital as the discount rate for all cash flows. Hence, they argue that if Equations (19) and (20) "are appropriate in their own terms,"[2] Equation (21) cannot be otherwise.

Their second argument is designed primarily to shore up their first. They recognize that it is necessary to defend the use of k_t as

---

[1]See, for example, Clark, Jantorni, and Gann, pp. 1015-16; Lusztig, p. 1017; Lev and Orgler, p. 1022; and Bower, "Issues in Lease Financing," p. 29.

[2]Johnson and Lewellen, "Reply," p. 1027.

the discount rate for tD_i on its own merits, and that it is not possible to simply "finesse" Equation (21) to prove their point. As a result, they fall back on the argument that

> the firm's ability actually to realize the intended package of tax-savings-cum-salvage is as uncertain as the prospect that the project involved will work out as predicted. If it does not, the fixed assets acquired will very likely have to be disposed of at distress prices, and/or additional costs of removal or transfer to other uses will be incurred.[1]

In other words, they believe that the nearly riskless depreciation tax shield and the highly risky after-tax salvage value average out to equal the risk of the overall investment project. Thus, they consider it appropriate to apply the firm's weighted average cost of capital to these flows in Equation (21).

The fallacy in this line of reasoning has been pointed out by Findlay.[2] He concedes that Johnson and Lewellen are correct in noting that the depreciation tax shield is a part of the total cash flow which is discounted at k_t in capital budgeting analyses. However, he maintains that it is incorrect to conclude that when such a flow is foregone (as when a decision is made to lease rather than purchase) it should be discounted at the overall cost of capital. As he points out, the components of a cash flow of a given risk character need not be of the given risk nor discounted at the rate which is applicable to the total flow.[3] It is certainly possible for a very risky cash stream to have components which are riskless.[4] As was indicated previously, the

---

[1] Ibid. [2] Findlay, p. 6.

[3] Findlay notes that if this were not true "it would be necessary to reformulate the theory of finance." See, Findlay, p. 6.

[4] Consider, for example, the high beta firm whose operating income includes earnings on riskless government securities.

presence of other income or carryback and carryforward options will allow the firm to discount tD_i at a relatively low rate. As for Johnson and Lewellen's argument that the use of k_t to evaluate tD_i and V_n "averages out" the risk of the two flows, Findlay notes that only by chance would k_t reflect the appropriate rate for the combined flows.[1]

Findlay also takes issue with Johnson and Lewellen's use of the cost of capital to discount the after-tax operating savings associated with the lease. It was noted earlier that O_i generally represents such expenses as insurance, maintenance, and property taxes which are subject to little or no uncertainty. As a result, $O_i(1 - t)$ should be discounted at some approximation of the riskless rate. Findlay notes that the more a given flow adds to the risk of a firm, the more eager the firm should be to allow the lessor to assume that flow.[2] Johnson and Lewellen's use of k_t, however, has just the opposite effect. The after-tax operating costs represented by $O_i(1 - t)$ are a benefit of leasing. They are expenses the firm will be able to avoid by entering into the lease contract. However, the use of a relatively high discount rate for this term will reduce its present value and will lower the net present value of leasing generated by Equation (21).

Despite its errors of omission and commission, Johnson and Lewellen's model represents an important step in the development of lease versus purchase methodologies. Their articles and the various comments and criticisms of their position have focused attention on some of the very basic issues in leasing theory. Johnson and Lewellen's unconventional "capital budgeting" approach demonstrates that there

---

[1]Findlay, p. 6. [2]Ibid., p. 4.

are alternative conceptual frameworks which may be used to approach the problem. This has forced other theorists to reexamine and to attempt to justify the lease-as-financing approach which stands as the conventional wisdom in financial theory. Johnson and Lewellen's challenge to the conventional wisdom has set off a new wave of interest in leasing and has caused many writers to crystalize their views on leasing theory. The result has been a series of articles surveying and synthesizing existing methods and proposing new models. It is to these articles that we now turn our attention.

The Schall model

The lease versus purchase model developed by Lawrence Schall is derived under the assumption that the objective of the firm is to maximize shareholder wealth.[1] Schall's model simultaneously considers the financing and investment aspects of the decision. In this regard, the following criteria are applied:

> An asset should be obtained only if the result is an increase in shareholder wealth; the method of financing should be that which raises that wealth by the greatest amount.[2]

Schall does not believe in separating the investment and financing decisions in lease-purchase analyses. He believes the financing element to be an integral part of the acquisition decision, since "the asset may be profitable under one financing method but not under another."[3] One of the unique features of Schall's model is that he does not necessarily assume the purchase will be financed with

---

[1]Schall, "Lease-or-Buy," pp. 1203-14. [2]Ibid., p. 1203.

[3]Ibid., p. 1208.

100 percent debt. His approach is to determine the financing method which results in the greatest change in shareholder wealth, and to acquire the asset if that change in wealth is positive.[1]

Another unique feature of Schall's method is that his final decision rule consists of two equations. The first calculates the change in shareholder wealth resulting from the lease:[2]

$$\delta W(L) = \sum_{i=1}^{n} \frac{[\bar{Z}_i - (\bar{C}_i - \bar{O}_i)](1-t)}{(1+k_a)^i} - \sum_{i=1}^{n} \frac{\bar{R}_i}{(1+k_b)^i} + \sum_{i=1}^{n} \frac{t\bar{R}_i}{(1+k_b)^i} \qquad (23)$$

where

$\delta W(L)$ = the change in shareholder wealth (W) as a consequence of the lease,

k_a and k_b = the discount rates applied by the market in evaluating the respective cash flows,[3]

and the bars over the previously defined variables represent their expected values.[4] The change in wealth resulting from the purchase is given by Equation (24):

---

[1]Ibid. It should be noted that leasing is considered to be one of the alternative means of financing the asset's acquisition.

[2]This is, in essence, the net present value of the lease. Schall's symbols will be adopted, however, because of his use of market determined discount rates to calculate the present values.

[3]Since $\bar{R}_i$ and $t\bar{R}_i$ differ only by a scale factor, the discount rate k_b is appropriate for both. Similar reasoning applies to any other variables in Equations (23) or (24) which are multiplied by (1 - t) or t. See, Schall, "Lease-or-Buy," p. 1207n.

[4]In an attempt to be as consistent as possible with Schall's symbols, bars will be included over all variables. It is understood that the distributions of some of these variables may have zero variances. See, ibid., p. 1208n.

$$\delta W(P) = \sum_{i=1}^{n} \frac{(\bar{Z}_i - \bar{C}_i) - t(\bar{Z}_i - \bar{C}_i) + t\bar{D}_i + \bar{S}_n - t_g(\bar{S}_n - \bar{B}_n)}{(1 + k_c)^i}$$

$$+ \sum_{i=1}^{n} \frac{t\bar{I}_i}{(1+k_d)^i} - A_o \qquad (24)$$

where

$\delta W(P)$ = the change in shareholder wealth as a consequence of the purchase,

k_c and k_d = the discount rates applied by the market in evaluating the respective cash flows,

and the bars, again, refer to the statistical expectations of the variables.

Equations (23) and (24) demonstrate that lease-or-purchase analysis consists of two decisions which are made simultaneously: the investment or acquisition decision and the financing decision. This may be seen by considering each equation in turn. First, Equation (23) represents the application of the standard capital budgeting framework to the lease alternative. Thus, if Equation (23) generates a positive value for $\delta W(L)$, acquisition of the asset's services by leasing represents a profitable investment. Furthermore, if $\delta W(L) > \delta W(P)$, leasing represents the appropriate (i.e., shareholder wealth maximizing) method of financing the acquisition. Equation (24), on the other hand, represents the standard capital budgeting framework for purchase, with one important difference. This equation includes an interest tax shield generated by any additional debt the firm may issue to finance the purchase of the asset. The inclusion of this term allows the firm to compare the method of financing the purchase with the lease financing option. Thus, if $\delta W(P)$ is positive and greater than $\delta W(L)$, purchase

represents the most profitable investment and the optimal method of financing the asset's acquisition.

It should be noted that Equation (23) and Equation (24) are very similar in form to Johnson and Lewellen's Equations (19) and (20). Indeed, the only difference is that Schall uses four market-determined discount rates and includes the interest tax shield in the purchase equation. Each of these differences will be considered in turn since they lie at the heart of Schall's approach to lease versus purchase analysis, and they clearly differentiate Schall's model from that of Johnson and Lewellen.

Schall justifies the use of multiple, market-determined discount rates on the basis of his Value Additivity Principle or VAP.[1] The VAP is a derivative of modern capital asset pricing theory and is an extension of the homemade diversification theorem.[2] The Value Additivity Principle states that, given capital markets which are perfect with zero transaction and information costs, "the total value of any stream Y_t

---

[1]Lawrence D. Schall, "Asset Valuation, Firm Investment, and Firm Diversification," Journal of Business 45 (January 1972): 11-28.

[2]An excellent review of contemporary capital asset pricing theory will be found in Jack Clark Francis and Stephen H. Archer, Portfolio Analysis (Englewood Cliffs, NJ: Prentice-Hall, 1971), pp. 111-44; and in Michael C. Jensen, "Capital Markets: Theory and Evidence," Bell Journal of Economics and Management Science 2 (Autumn 1972): 357-98. The seminal works in the development of the homemade diversification theorem include: William W. Alberts and Joel E. Segall, eds., The Corporate Merger (Chicago: University of Chicago Press, 1966), pp. 235-87; Stewart C. Myers, "Procedures for Capital Budgeting Under Uncertainty," Industrial Management Review 9 (Spring 1968): 1-19; and Jan Mossin, "Security Pricing and Investment Criteria in Competitive Markets," American Economic Review 59 (December 1969): 749-56.

received by investors in the market is independent of how it is divided into the separate income streams of one or more firms, $(Y_1,\ldots, Y_n)$, in being made available to the market.[1] Mathematically, this may be expressed as follows:

$$\text{If } Y_t = \sum_{i=1}^{n} Y_i, \text{ then } V[Y_t] = \sum_{i=1}^{n} V[Y_i] \tag{25}$$

where

$(Y_1,\ldots, Y_n)$ = any arbitrary division of Y_t into separate after-tax debt or equity streams, and

$V[Y]$ = equilibrium market value of stream Y.

As Schall points out, "a major implication of the VAP is that any investment is to be valued solely in terms of the incremental after-corporate-tax returns it generates and without any regard to the stochastic relationship of those returns to the earnings produced by the other assets of the firm."[2] In other words, each cash flow should be discounted at the rate which investors would apply to the flow if it were available individually in the market. This rate will, of course, be a function of the risk of the stream.[3]

According to Schall, it is likely that the four discount rates in Equations (23) and (24) will be unequal. For example, it is improbable

---

[1]Schall, "Lease-or-Buy," p. 1204.

[2]Ibid. This is, in essence, a restatement of the homemade diversification theorem.

[3]Schall notes that the VAP holds in the multiperiod case with risky and riskless debt and is valid regardless of how investors value cash flows. However, the relation given by Expression (25) is derived from "the single period, homogeneous expectations, riskless debt, mean-variance capital asset pricing model." See, Schall, "Lease-or-Buy," p. 1205n.

that k_a would equal k_c since the cash streams they discount would, in general, have different distributions. Similarly, $k_b \neq k_d$ because of the differential risk characteristics of the lease and debt alternatives.[1]

It should be noted that Equations (23) and (24) employ composite discount rates for the operating flows associated with the investment. That is, k_a and k_c are used in evaluating total cash flows made up of streams which have varying degrees of risk. For example, k_c is used to discount a risky flow $(\overline{Z}_i - \overline{C}_i)$ as well as a riskless flow tD_i. This presents no particular problem, however, since k_a and k_c are defined as the market determined rates appropriate to the composite cash flows. A problem does arise, however, in analyses such as Johnson and Lewellen's when composite cash streams are disaggregated and the rate which is appropriate to the entire stream is applied to riskless components of that stream. Thus, Johnson and Lewellen's use of k_t to discount tD_i does not appear to be appropriate, while Schall's composite rate of k_c is, by definition, the correct rate for the operating flow in Equation (24).

As noted previously, Schall does not attempt to separate the acquisition and financing decisions in lease-purchase analysis. In this respect his model is truly unique. The interest tax shield which enters Equation (24) is not an equivalent tax shield nor does it

---

[1]Schall indicates that these differences may arise from the fact that lease payments are tax deductible whereas the tax deductibility of interest may be limited by the government. In addition, bond indentures and loan covenants generally place more restrictions on the firm than lease agreements.

represent 100 percent debt financing of the purchase.[1] It is the tax shield resulting from "the additional interest which would be incurred by the firm were the asset purchased using the preferred (shareholder wealth maximizing, i.e., $\delta W(P)$ maximizing) method of purchase financing."[2] According to Schall, the optimal financing mix could involve the issuance of new debt or equity, the reduction of current dividends or the use of cash which would otherwise be retained if the asset were not purchased.[3] Thus, the value of $t\bar{I}_j$ might equal zero if debt is not an appropriate component of the financing plan.

Implicit in Schall's approach is the recognition that a financial lease is, by its very nature, a hybrid. That is, a leasing decision must necessarily involve considerations of both investment and finance. As Johnson and Lewellen point out, the application of a pure financing approach to lease-purchase decisions may lead the firm to reject an especially attractive lease.[4] In addition, the specification of full debt financing as the alternative to leasing makes a presumption that such financing is optimal from the standpoint of shareholder wealth maximization. On the other hand, a pure investment approach (such as that proposed by Johnson and Lewellen) ignores the fact that the lease provides the firm with an alternative means of financing the asset's acquisition.

---

[1] Schall notes that it is particularly unlikely that the purchase would be 100 percent debt financed if the debt and lease obligations are not considered equivalent. See, Schall, "Lease-or-Buy," p. 1207.

[2] Ibid., pp. 1206-7. [3] Ibid., p. 1203n.

[4] Johnson and Lewellen, "Reply," p. 1025.

Schall recognizes that the very nature of the lease versus purchase decision makes it impossible to separate investment and financing considerations. As he points out,

> whether acquisition is justified may depend upon how the asset is financed. The asset may be profitable under one financing method but not under another, e.g., leasing and not purchase may produce a net gain.[1]

On the other hand, purchase with 80 percent debt and 20 percent equity may be more profitable than leasing.[2] To reiterate Schall's position, the proper approach is to determine the type of financing producing the highest δW (i.e., the best method of financing), and to acquire the asset only if that highest δW is positive.

Schall's model represents a significant advancement of leasing theory. In addition to being the first model derived from the single-factor capital asset pricing model,[3] it is the first approach to attempt a simultaneous optimization of both the financing and investment decisions. From a theoretical standpoint, Schall's approach is clearly the most rigorous model developed to date. As is so often the case,

---

[1] Schall, "Lease-or-Buy," p. 1208.

[2] See, for example, Schall's numerical example: ibid., pp. 1209-10.

[3] Schall's Value Additivity Principle is derived under the assumption of a single-period model with homogeneous expectations, the existence of riskless debt, Markowitz efficient diversification by investors, and no taxes or transactions costs. This model is generally associated with the following theorists: Jack L. Treynor, "Toward a Theory of Market Value of Risky Assets" (1961, typewritten); William F. Sharpe, "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk," Journal of Finance 19 (September 1964): 425-42; John Lintner, "Security Prices, Risk and Maximal Gains from Diversification," Journal of Finance 20 (December 1965): 587-615; and Jan Mossin, "Equilibrium in a Capital Asset Market," Econometrica 34 (October 1966): 768-83.

however, abstract theoretical approaches pose significant operational problems.

One such problem is the estimation of the appropriate discount rates in Equations (23) and (24). Since k_a through k_d are defined as market determined rates, Schall states that "the firm must estimate the k by observing market rates on comparable streams."[1] For example, he suggests that k_a may be approximated by observing the returns and market values of all-equity firms that own comparable assets and earn $[\overline{Z}_i - (\overline{C}_i - \overline{O}_i)](1 - t)$. The practical problems involved in such an estimating procedure are obvious. Schall recognizes this fact and suggests that, in practice, only general estimates are possible.[2] Thus, he concludes that "for the practitioner . . . the analysis here is meant to suggest that some attempt should be made to adjust for individual asset risk even though a precise determination is impossible."[3]

Schall offers an alternative approach which may be used to determine k_b and k_d. He notes that it is more common, and perhaps more accurate, to view R_i and I_i as the contractually determined lease and interest payments rather than their statistical expectations.[4] As a result, k_b and k_d would become the risk-adjusted rates used by investors in evaluating the highly certain lease and interest obligations.[5] Schall suggests that if the risks of R_i and I_i are similar, they may both be

---

[1]Schall, "Lease-or-Buy," p. 1208. [2]Ibid., p. 1209. [3]Ibid.

[4]Ibid., p. 1208n.

[5]This is the approach Schall takes in his numerical example, see, ibid., pp. 1209-10.

approximated by the debt rate r_t.[1] Thus, we see a return to the use of r_t as an approximation of the riskless rate for contractual streams.

A second practical problem concerns the determination of the optimal financing mix for the purchase alternative. Schall provides little guidance in the area, but implicit in his presentation is the notion that the firm should seek to maintain some target debt-equity ratio. He notes that Equation (24) leads to "the familiar conclusion that the tax deductibility of interest encourages financing entirely with debt."[2] That is, $\delta W(P)$ increases as I_i increases. Schall implies that the firm should fall back on Modigliani and Miller's suggestion of a target debt to equity ratio to avoid the untenable conclusion that the firm should be financed with 100 percent debt.[3] Of course, the practitioner is left with the problem of determining the optimal ratio as well as the determination of the optimal financing mix for each specific asset acquisition. One possible approach would be to finance each purchase with the firm's target proportion of debt and equity. However, equity flotation costs would make this impractical for relatively small acquisitions. As a result, it is difficult to generalize with respect to the method of determining the purchase financing.

A related problem concerns the question of differential financial risk between the lease and purchase options. It was noted in the discussion of Vancil's model that a meaningful lease-purchase

---

[1] Ibid. [2] Ibid., p. 1206.

[3] Franco Modigliani and Merton H. Miller, "Corporate Income Taxes and the Cost of Capital: A Correction," American Economic Review 53 (June 1963): 433-43.

comparison requires an equivalence of financial risk between the alternatives. However, Schall has abstracted from this problem by deriving his Value Additivity Principle under the assumption that capital markets are perfect with no transaction or bankruptcy costs.[1] Of particular importance is the assumption that bankruptcy is frictionless. That is, if bankruptcy occurs, the firm's assets can be sold at their economic values without selling or legal expenses. As Van Horne points out, when bankruptcy costs are significant, projects may no longer be evaluated without regard to their stochastic relationship with the firm's other assets.[2] This is because the probability of bankruptcy is a function of a firm's total risk, not just its systematic component.[3] Thus, as Schall himself points out, the existence of capital market imperfections (including bankruptcy transaction costs) may invalidate the Value Additivity Principle.[4] In this instance, the firm would have a "portfolio problem" and assets would not be valued individually.[5]

The implications for the practitioner are clear. Some consideration must be given to the implicit capital costs associated with lease financing. To the extent that the fixed commitments under the lease exceed the fixed charges resulting from purchase financing, financial risk may be increased and the firm's overall cost of capital

---

[1]Schall, "Asset Valuation," p. 13. [2]Van Horne, 3rd ed., p. 209.

[3]Ibid.

[4]Schall, "Asset Valuation," pp. 26-27, and "Lease-or-Buy," p. 1209n.

[5]Schall, "Lease-or-Buy," p. 1209n.

may be raised. On the other hand, if some investors perceive less financial risk with leasing (because of its off balance sheet accounting treatment), then leasing may have a more favorable impact on the cost of capital than an equivalent amount of debt. It is this last possibility which concerns M. Chapman Findlay.

Findlay's Net Present Value model

Findlay takes the position that net present value models are not well suited for dealing with financial risk differences between the lease and purchase alternatives. He believes that they are able to consider investment risk differences through the use of risk-adjusted rates and certainty equivalents, but that the nature of the NPV summary measure makes it difficult to analyze the differential capital structure effect of the lease and purchase options.

The difficulty arises because a negative NAL is generally interpreted as an unambiguous decision to reject the lease. This may not be a correct decision, however, if the lease is viewed as adding less financial risk to the firm than an equivalent amount of debt financing. The question becomes: how negative must the NAL be before a clear reject decision is indicated?

Findlay believes that the summary measure generated by internal rate of return (IRR) methods is better suited to address this question.[1] Most IRR models calculate an after-tax cost of leasing expressed as a percent. As indicated earlier, the after-tax internal rate of return is

---

[1] It should be noted that Findlay believes NPV models are better able to deal with investment risk differences than IRR models. However, it is quite possible to deal with investment risk within an IRR framework through the application of certainty equivalent and risk adjustment factors. This issue will be discussed later in the chapter.

given by ρ_t. Findlay notes that when the lease and the alternative loan are equivalent from the standpoint of financial risk, ρ_t may be compared directly with the after-tax debt rate r_t. If $\rho_t > r_t$, a clear decision in favor of purchase is indicated. However, if the lease is perceived as adding less financial risk to the firm, a percentage cost of leasing which exceeds r_t is less clear-cut in its implications.

Findlay notes that the theoretical solution is to compare ρ_t with the "equi-marginal opportunity cost of leasing in the optimal capital structure."[1] However, since the present state of the art in financial theory does not allow for a precise computation of this rate, Findlay suggests that a top management policy decision arises. He points out that k_t sets the upper bound for decision making. That is, if the lease is viewed as adding no financial risk to the firm, ρ_t would be compared with k_t. Thus, the use of an internal rate of return criterion sets upper and lower limits on the range of ρ_t for decision making purposes. This makes it much easier for practitioners to deal with situations in which financial risk differences are assumed to exist between the lease and the loan.

For example, if management believes that leasing has a more favorable effect on the cost of equity capital than debt, they may be willing to enter into a lease contract despite the fact that $\rho_t > r_t$. The amount by which ρ_t exceeds r_t may be viewed as the "price" the firm is willing to pay to keep the fixed commitments off the balance sheet. Findlay believes that it is easier for management to make this decision in terms of percentage rates than net present values.

---

[1] Findlay, p. 13b.

In view of the Chapter II discussion of off balance sheet financing, it appears unlikely that firms will be able to gain by attempting to "disguise" their contractual commitments in the form of leases. However, Wehle's study indicates that some firms believe the disclosure requirements of leases are an advantage in dealing with less sophisticated statement users.[1] Thus, Findlay's approach may appeal to some segments of industry.

Findlay recommends a dual approach to lease versus purchase analysis. He believes that the choice of the analysis model depends upon the situation at hand; and he divides potential leasing situations into two broad categories.[2] The first is the situation in which leasing "is a readily-available, homogeneous source of finance."[3] That is, leasing is available on similar terms for a wide variety of assets. As such, it may be viewed as a regular source of financing and should have some optimal proportion in the firm's capital structure.[4] The alternative to leasing in this instance is seen to be debt, and Findlay recommends the use of an IRR model in order to deal effectively with potential financial risk differences between leasing and borrowing. The second situation occurs "when leasing is only available for a limited number of assets at irregular intervals."[5] In this instance, "the

---

[1]Wehle, p. VI-56.

[2]Findlay also adds a third situation in which the asset may only be leased. He recommends a NPV approach in this instance. See, Findlay, p. 14.

[3]Ibid., p. 1a.

[4]For a discussion of this point, see Van Horne, 3rd ed., pp. 596-97.

[5]Findlay, p. 1a.

notion of leasing having some optimal weight in the capital structure at a stable long-run cost is less compelling."[1] Thus, leasing is viewed as a means of acquiring an asset on a one-time basis at extremely attractive terms rather than as a continuous source of low-cost finance. In such a situation, Findlay recommends his NPV approach.[2]

Findlay's model is similar to the approaches of Bierman and Smidt and Weston and Brigham.[3] Indeed, it will be shown that under certain conditions the three models generate identical net present values. The unique feature of Findlay's model is his application of a certainty equivalent framework to a net present value model:[4]

$$NAL = A_o - \sum_{i=1}^{n} \frac{R_i}{(1+r_t)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1+r_t)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+r_t)^i}$$

$$+ \sum_{i=1}^{n} \frac{\psi_i O_i (1-t)}{(1+r_t)^i} - \frac{\lambda V_n}{(1+r_t)^n} \qquad (26)$$

where ψ_i = a risk adjustment coefficient, and

λ = a certainty equivalent coefficient.

The after-tax debt rate r_t is applied to the lease payments, the lease payments' tax shield, and the depreciation tax shield as an approximation of the riskless rate. The adjustment factor λ applied to

---

[1] Ibid., p. 13.

[2] Findlay's IRR model will be covered later in this chapter.

[3] Bierman and Smidt, 2nd ed., pp. 218-27; and Weston and Brigham, 4th ed., pp. 462-68.

[4] It should be noted that Findlay derives Equation (26) under the assumption of an equivalent loan equal to the present value of the lease payments discounted at r. For a discussion of the derivation of Equation (26), see, Bower, "Issues in Lease Financing," p. 26, pp. 33-34. Findlay's derivation appears on pages 7-10 of his paper.

the after-tax salvage value is a normal certainty-equivalent coefficient which takes on values between 0 and 1.00 and varies inversely with the risk of V_n.[1] The coefficient ψ_i, on the other hand, is not a certainty equivalent but rather a risk adjustment factor which assumes values equal to or greater than 1.00 and varies directly with the risk of O_i. This results from the fact that the greater the risk of O_i the more willing the firm will be to lease and allow the lessor to incur these operating expenses.[2] In most instances, however, O_i will represent fixed costs with no uncertainty and ψ_i will equal 1.00.[3]

In the special case in which $\psi_i = 1.00$ and $\lambda/(1 + r_t)^n$ equals $1/(1 + k_t)^n$, it can be shown that Equation (26) generates an NAL which is identical to that of Weston and Brigham's Equation (17).[4] By Equations (14) and (18), we see that:

$$\sum_{i=1}^{n} \frac{L_i}{(1+r_t)^i} - \sum_{i=1}^{n} \frac{tI_i}{(1+r_t)^i} = A_o \qquad (27)$$

where L_i and tI_i represent the loan payments and resultant interest tax shields from Weston and Brigham's model.[5] Substituting the right hand side of (27) into Equation (17), Weston and Brigham's model becomes:[6]

---

[1]For a discussion of certainty-equivalent coefficients, see, Van Horne, 3rd ed., pp. 138-39, or Alexander A. Robichek and Stewart C. Myers, Optimal Financing Decisions (Englewood Cliffs, NJ: Prentice-Hall, 1965), pp. 79-93.

[2]Findlay, p. 4. [3]Ibid., p. 9.

[4]Previously it was demonstrated that Weston and Brigham's model is formally equivalent to Bierman and Smidt's approach.

[5]This identity is a natural consequence of the fact that Weston and Brigham assume the purchase is 100 percent debt financed.

[6]This is, in essence, an alternative method of showing the equivalence of Equations (16) and (17).

$$NAL = A_o - \sum_{i=1}^{n} \frac{R_i}{(1+r_t)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+r_t)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1+r_t)^i}$$

$$+ \sum_{i=1}^{n} \frac{O_i(1-t)}{(1+r_t)^i} - \frac{V_n}{(1+k_t)^n} \qquad (17')$$

Since, by assumption, $\psi_i = 1.00$ and

$$\frac{\lambda}{(1+r_t)^n} V_n = \frac{1}{(1+k_t)^n} V_n \qquad (28)$$

Equation (26) may be written:

$$NAL = A_o - \sum_{i=1}^{n} \frac{R_i}{(1+r_t)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+r_t)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1+r_t)^i}$$

$$+ \sum_{i=1}^{n} \frac{O_i(1-t)}{(1+r_t)^i} - \frac{V_n}{(1+k_t)^i} \qquad (26')$$

Thus, it is seen that when O_i is riskless and V_n is in the same "risk class" as the firm,[1] Findlay's model is identical to Weston and Brigham's approach.

This may be demonstrated by the application of Equation (26') to the Johnson and Lewellen example. The appropriate value for the certainty equivalent coefficient is determined by solving the following equation for λ and substituting the Johnson and Lewellen numbers:

$$\frac{\lambda}{(1+r_t)^n} = \frac{1}{(1+k_t)^n}$$

---

[1] For a discussion of this concept, see, Mark E. Rubinstein, "A Mean-Variance Synthesis of Corporate Financial Theory," Journal of Finance 28 (March 1973), p. 174.

$$\lambda = \frac{(1+r_t)^n}{(1+k_t)^n}$$

$$\lambda = \frac{(1.04)^5}{(1.12)^5} = .69$$

Thus, when $\psi_i = 1.00$ and $\lambda = .69$, Equation (26') generates an NAL of $429 for the Johnson and Lewellen problem:

$$\$429 = \$15{,}000 - \$18{,}698 - \$6{,}852 + \$9{,}349 + \$2{,}226 - \$596 \quad (26')$$

This is identical to the value calculated using Weston and Brigham's Equation (17). Of course, only by chance would $\lambda/(1 + r_t)^n$ equal $1/(1 + k_t)^n$.[1] Nevertheless, if $\lambda/(1 + r_t)^n$ is in the vicinity of $1/(1 + k_t)^n$ when $\psi_i = 1.00$ (that is, if V_n is in approximately the same risk class as the firm when O_i is riskless), the two models will likely generate the same accept-reject decision.

As in the case of Schall's method, there are practical implementation problems associated with Findlay's approach. Determining a method of calculating ψ_i and λ is a particularly troublesome problem. In theory, ψ_i and λ should be determined on the basis of the market's perception of the risk of O_i and V_n. For example, Findlay suggests that $\psi_i = 1 + f(\beta_o)$ if the firm assumes a strong form of the capital asset princing model.[2] Similarly, the certainty equivalent coefficient

---

[1] Findlay, p. 9.

[2] Here β_o is Sharpe's familiar beta coefficient and is defined as

$$\beta_o = \frac{\text{Cov}(O_i, R_m)}{\text{Var } R_m}$$

λ would be given by $\lambda = 1 - f(\beta_o)$. The difficulties involved in operationalizing these measures, however, are clearly formidable.[1] The situation is analogous to Schall's market determined discount rates, the practitioner may only hope to attain general estimates of ψ_i and λ.

A second concern with Findlay's model is more conceptual in nature. Findlay's NPV approach is designed to deal with situations in which the lease is viewed as "a one-time bargain purchase rather than a perpetual source of low-cost finance."[2] Implicit in this approach is the assumption that the alternative to leasing is purchase with cash. This seems to be inconsistent with his model, however, since we have shown that Equation (26) is formally equivalent to two approaches which explicitly assume 100 percent debt financing of the purchase. In most practical situations we should expect Findlay's model to generate identical accept-reject decisions with Bierman and Smidt's model and Weston and Brigham's model. As a result, the only important difference between Equation (26) and the earlier lease-or-borrow approaches is Findlay's use of risk-adjustment factors for O_i and V_n.

---

where $Cov(O_i,R_m)$ = the covariance of O_i and the return on the market portfolio R_m, and

$Var\ R_m$ = the variance of the return on the market portfolio.

See, Sharpe, pp. 425-42.

[1] See, for example, Richard S. Bower and Donald R. Lessard, "An Operational Approach to Risk-Screening," Journal of Finance 28 (May 1973): 321-37; and Van Horne, 3rd ed., pp. 200-205.

[2] Findlay, p. 13.

Summary and conclusions: NPV methodologies

It was noted in the Introduction to this chapter that the form of a lease analysis model is largely a function of the author's conceptual view of leasing. The review of the net present value models has identified at least three conflicting viewpoints among financial theorists. First, there are those writers who consider the lease versus purchase problem to be a pure financing decision. At the other extreme are those individuals, notably Johnson and Lewellen, who take a pure investment approach to the decision. Finally, the middle ground is occupied by theorists who feel that lease-purchase must involve considerations of both investment and finance. In the following paragraphs, the various NPV methodologies are classified according to their conceptual orientation and the important differences among the approaches are reviewed.

Lease-purchase as a financing decision. Approaches which fall into this category include the conventional methodologies,[1] the Basic Interest Rate approach, and the Bower, Herringer, and Williamson model. These techniques are classified as pure financing approaches because they separate the acquisition decision from the financing decision and they view lease-purchase analysis as a lease-or-borrow problem. Separation of the acquisition and financing decisions means that the investment must first be justified on an ownership basis before consideration is given to the question of leasing. As Cooper and

[1]The conventional methodologies include the Cohen model, the Weston and Craig approach, and the subsequent Weston and Brigham methods.

Strawser note, this approach "is a corollary of the notion that a capital investment project should be evaluated without reference to its method of financing."[1] Thus, once the purchase option is shown to be profitable, the analysis turns to the question of the lowest cost method of financing the acquisition. The two alternatives considered by these techniques are lease and 100 percent debt.

A major criticism of this approach is that an ex ante investment analysis which assumes the asset will be purchased may cause the firm to overlook particularly attractive leasing opportunities. In other words, it is possible for a sufficiently low lease rate to reverse an original negative purchase decision.

A second significant criticism of these techniques is their assumption that 100 percent debt financing is the appropriate alternative to leasing. This assumption has been questioned by Schall and will be discussed in a later section.

Lease-purchase as an investment decision. The only theorists to publish a pure investment approach to lease analysis are Johnson and Lewellen. These authors view the lease as a long-term acquisition of services contract which differs in timing but not in financing impact from a purchase.[2] As such, they apply the traditional capital budgeting framework to the lease and purchase options. This results in their Equation (21) which excludes an interest tax-shield term and employs k_t as the discount rate for tD_i and $O_i(1 - t)$.

---

[1]Kerry Cooper and Robert H. Strawser, "Evaluation of Capital Investment Projects Involving Asset Leases," Financial Management 4 (Spring 1975), p. 4.

[2]Johnson and Lewellen, "Lease-or-Buy," p. 816.

Johnson and Lewellen have been criticized both for the exclusion of the interest term and for the use of k_t to discount seemingly riskless cash flows. They justify the exclusion of interest on the grounds that "received doctrine" in capital budgeting calls for the elimination of all financing charges from the analysis. Their justification for the use of k_t to discount low-risk flows is somewhat more complex. They argue that the firm's chances of realizing the tax savings and salvage value flows "is as uncertain as the prospect that the project involved will work out as predicted."[1] Thus, in their view, the highly uncertain salvage value and the nearly certain depreciation and operating expense flows average out to equal the risk of the overall investment project. As a result, they consider it appropriate to apply the firm's after-tax cost of capital to these flows.

The pure investment approach of Johnson and Lewellen has attracted few adherents among financial theorists. The financial community does not appear willing to accept their acquisition-of-services approach to leasing. The consensus view appears to be that the lease provides the firm with an alternative source of financing and that the lease-purchase analysis must take this fact into account. Moreover, few writers appear willing to accept their argument that the weighted average cost of capital should be applied to flows which are nearly risk-free.

It must be pointed out, however, that Johnson and Lewellen have provided an important service by focusing attention on the investment aspects of the lease versus purchase problem. They make it clear that

---

[1]Johnson and Lewellen, "Reply," p. 1027.

a proper assessment of project profitability must consider both the lease and purchase option. Indeed, their work has led to a recognition by a number of writers that lease-purchase analysis must consider both the financing and investment aspects of the alternatives.[1]

Lease-purchase as a financing and investment decision. Schall has developed a model which allows for the simultaneous consideration of the financing and investment aspects of the decision. Schall's Equations (23) and (24) are set in the standard capital budgeting framework for the lease and the purchase alternatives. Thus, positive values for $\delta W(L)$ and $\delta W(P)$ indicate that both options are profitable from an investment standpoint. The financing decision is made by selecting the alternative with the largest positive δW. Schall's approach is unique in that the financing decision is not confined to a choice between lease and 100 percent debt. Purchase financing may include new equity or debt issues, reduction of dividends or the use of cash which would otherwise be retained.

Schall's methodology recognizes that the lease is a hybrid and that it is not possible to separate its financing and investment implications. Moreover, the model applies discount rates which are appropriate to the risk of the various flows. While there are a number of practical implementation problems with the Schall model, it, nevertheless, represents an important step toward a resolution of the conceptual differences in the area of lease versus purchase analysis.

---

[1]See, for example, Schall, "Lease-or-Buy," 1203-14; Robert C. Carlson and Donald H. Wort, "A New Look at the Lease-vs.-Purchase Decision," Journal of Economics and Business 26 (Spring 1974): 199-202, and Cooper and Strawser, 44-49.

Other net present value approaches. It should be noted that three of the approaches presented in this chapter do not fall neatly into any of the above categories. These include the Eiteman and Davisson method, the Bierman and Smidt approach, and Findlay's NPV model.

The Eiteman and Davisson technique is intended more as an illustrative example than a general lease versus purchase model.[1] This approach simply compares the purchase price of the asset with the present value of the lease payments and foregone salvage value. There is no attempt to approach the problem either from the standpoint of a financing decision or an investment decision. The model simply compares the "costs" of the two alternatives.

The Bierman and Smidt model, on the other hand, is clearly a lease-or-borrow analysis. The choice is between financing the asset's acquisition with a lease or with 100 percent debt. However, there is an important difference between this approach and other lease versus borrow methodologies. Bierman and Smidt recommend that the investment analysis be performed after the lease versus debt choice has been made. Thus, the investment analysis is not automatically performed under the assumption of ownership as in the case of the other pure financing approaches. If Bierman and Smidt's Equation (16) generates a positive NAL, the capital budgeting computations will be made under the assumption of lease rather than purchase. This ex post investment analysis has the effect of bringing the investment element back into the decision. As such, Bierman and Smidt's model is more closely

---

[1]Telephone interview with Dr. Wilford J. Eiteman, July 28, 1975.

related to Schall's technique than to the pure financing methods. The major conceptual difference between the two approaches is that Bierman and Smidt assume 100 percent debt financing of the purchase while Schall allows for non-debt financing.

In contrast to other writers in the field of lease-purchase analysis, Findlay holds the view that net present value methods should only be applied when leasing does not constitute a regular source of finance for the firm. Findlay's NPV model is designed for the company which confronts lease opportunities on an infrequent basis as one-time bargain opportunities. For firms which regularly employ leasing as a continuous source of finance, Findlay recommends an internal rate of return technique. IRR models are, by definition, pure financing approaches, and Findlay believes that these methods are better able to deal with financial risk considerations than net present value models. In his view, NPV methodologies are more aptly suited to consider the investment risk elements of the decision. Findlay's NPV method is neither a pure financing nor a pure investment approach. In concept, it is somewhat akin to Eiteman and Davisson's "cost" comparison technique. However, from a practical standpoint, it has been demonstrated that Findlay's model will generate results which are very similar to Weston and Brigham's pure financing approach. The Findlay IRR method will be considered, along with the other internal rate of return methodologies, in the following section.

Internal Rate of Return Models

This section will cover the major lease-purchase models which employ the internal rate of return criterion. IRR approaches generate

an interest cost of leasing which is usually compared with the interest rate on an equivalent amount of debt financing. As such, IRR models may be viewed as pure financing approaches.

The proponents of internal rate of return point to the fact that this approach avoids the problem of selecting the appropriate rate of discount. In addition, it is suggested that IRR models are more easily interpreted by practitioners who are used to making financing decisions on the basis of alternative interest costs.

There is much less disagreement among theorists concerning IRR models than there is with NPV models. Indeed, the majority of published methods are simply variations of a single approach known as the traditional model. In the following section, the traditional model is introduced and its many variations are contrasted and compared.

The traditional IRR model

The traditional internal rate of return model solves the following equation for the after-tax cost of leasing ρ_t:

$$0 = A_o - \sum_{i=1}^{n} \frac{R_i}{(1+\rho_t)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+\rho_t)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1+\rho_t)^i} + \sum_{i=1}^{n} \frac{O_i(1-t)}{(1+\rho_t)^i} - \frac{V_n}{(1+\rho_t)^n} \quad (29)$$

The decision rule is to lease the asset if $\rho_t < r_t$, where r_t equals the after-tax interest rate on a similar amount of intermediate-term debt.

In essence, Equation (29) calculates the discount rate which equates the present value of the lease cash flows with the purchase cash flows. The resulting internal rate of return in interpreted as the

interest cost of leasing--the implicit interest charge incurred by the lessee. If this rate is below the firm's debt cost, it is less expensive to lease than it is to purchase the asset with borrowed funds.

Findlay notes that Brigham's lessor return model is actually the first published version of the traditional approach.[1] Brigham's model is designed to calculate the effective yield on a lease to the lessor:[2]

$$0 = -A_o - \sum_{i=1}^{n} \frac{R_i}{(1+r_\tau)^i} + \sum_{i=1}^{n} \frac{tD_i}{(1+r_\tau)^i} - \sum_{i=1}^{n} \frac{tR_i}{(1+r_\tau)^i} + \frac{V_n}{(1+r_\tau)^n} \tag{30}$$

where r_τ equals the after-tax rate of return. If the signs on all of the terms in Equation (30) are reversed, we have a lessee decision model which is formally identical to Equation (29).[3] The only difference is the absence of $O_i(1 - t)$ from Brigham's equation.

The first published version of the traditional approach to be specifically designated as a lease versus purchase model appears in Quirin's 1967 work.[4] Quirin presents the model, without comment, as the solution to an example problem:

---

[1]Brigham, "Equipment Lease Financing," pp. 73-74. The first application of the internal rate of return method to the leasing problem is to be found in McEachron, pp. 213-19.

[2]Brigham's original model included a term for the investment tax credit. This has been ignored here for the sake of consistency.

[3]Findlay, p. 11.

[4]G. David Quirin, The Capital Expenditure Decision (Homewood, IL: Richard D. Irwin, 1967), p. 119.

$$0 = A_o - \sum_{i=1}^{n} \frac{R_i}{(1+\rho_t)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+\rho_t)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1+\rho_t)^i} \qquad (31)$$

It should be noted that this model is very similar to the NPV approach offered by Bierman and Smidt in Equation (16):

$$NAL = A_o - \sum_{i=1}^{n} \frac{R_i}{(1+r_t)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+r_t)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1+r_t)^i} \qquad (16)$$

The only important difference between the models is their summary measure. Equation (16) uses the after-tax debt rate to discount the flows in order to calculate the net present value advantage of the lease. Quirin's approach, on the other hand, solves for the internal rate of return of the cash flows and compares this with the after-tax cost of debt. As such, both models lead to the same accept-reject decision.

A model which is formally identical to Quirin's was presented by Mitchell in 1970.[1] This is the first IRR model to be presented in equation form:

$$0 = A_o - \sum_{i=0}^{n} \frac{R_i}{(1+\rho_t)^i} - \sum_{i=0}^{n} \frac{tD_i}{(1+\rho_t)^i} + \sum_{i=0}^{n} \frac{tR_i}{(1+\rho_t)^i} \qquad (32)$$

The difference between this approach and that of Equation (31) is the timing of the cash flows. Mitchell's model assumes that all flows occur at the beginning of the period rather than at the end.

---

[1] G. B. Mitchell, "After-Tax Cost of Leasing," Accounting Review 45 (April 1970): 308-14. A very similar model was developed independently by Doenges in 1971. See, R. Conrad Doenges, "The Cost of Leasing," Engineering Economist 17 (Fall 1971): 31-44.

The Mitchell approach was offered as an alternative to a methodology proposed by Beechy.[1] Beechy's method generates a pre-tax internal rate of return. The corrected version of this model is shown as Equation (33):[2]

$$0 = A_0 - \sum_{i=1}^{n} \frac{R_i}{(1+\rho)^i} + \sum_{i=1}^{n} \frac{tL''_i}{(1+\rho)^i} - \sum_{i=1}^{n} \frac{tI''_i}{(1+\rho)^i}$$

$$- \sum_{i=1}^{n} \frac{tD_i}{(1+\rho)^i} + \sum_{i=1}^{n} \frac{O_i(1-t)}{(1+\rho)^i} - \frac{V_n}{(1+\rho)^n} \qquad (33)$$

where ρ equals the pre-tax cost of leasing. Beechy uses the Bower, Herringer, and Williamson equivalent loan technique to construct the tax shields given by the third and fourth terms of the equation. The equivalent loan payments are generated by Equation (12):

$$L''_i = R_i[(A_0)/(J_0)] \qquad (12)$$

where L''_i = BHW's equivalent loan payments, and

$$J_0 = \sum_{i=1}^{n} \frac{R_i}{(1+r)^i}$$

The equivalent interest payments I''_i are calculated as shown in Table 4.

The form of the summary measure is the only important difference between Equation (33) and the traditional IRR model of Equation (29). Beechy's pre-tax rate is equal to the traditional model's after-tax rate

---

[1]Thomas H. Beechy, "Quasi-Debt Analysis of Financial Leases," Accounting Review 44 (April 1969): 375-81.

[2]Thomas H. Beechy, "The Cost of Leasing: Comment and Correction," Accouting Review 45 (October 1970): 769-73.

multiplied by 1/(1 - t). Thus, both models will lead to the same accept-reject decision.

The equivalence of the Beechy and Mitchell models may be demonstrated by applying both approaches to the Johnson and Lewellen example. Substituting the appropriate figures into Equation (29) generates an after-tax lease rate ρ_t equal to 3.6 percent. Application of Beechy's model to the Johnson and Lewellen problem yields a pre-tax lease rate ρ of 7.2 percent. Thus, Beechy's IRR is exactly twice Mitchell's rate based on a tax rate of 50 percent. Since r = 8 percent and r_t = 4 percent, both models indicate that leasing is less expensive than purchasing.

The most recently developed version of the traditional approach appears in Findlay's 1973 paper.[1] Findlay's model is shown as Equation (34):

$$0 = A_0 - R_0 - \sum_{i=1}^{n-1} \frac{R_i}{(1+\rho_t)^i} + \sum_{i=1}^{n-1} \frac{tR_{i-1}}{(1+\rho_t)^i} - \sum_{i=1}^{n-1} \frac{tD_i}{(1+\rho_t)^i}$$

$$+ \sum_{i=1}^{n-1} \frac{O_i(1-t)}{(1+\rho_t)^i} + \frac{tR_{n-1} - tD_n + O_n(1-t) - V_n}{(1+\rho_t)^n} \qquad (34)$$

The important practical difference between this methodology and Equation (29) is that Findlay assumes prepayment of the lease rentals. Otherwise, the models are formally equivalent.

From a conceptual standpoint, however, Findlay's version represents a departure from previous presentations of the traditional model. As noted earlier, Findlay divides potential leasing situations

---

[1] Findlay, p. 12.

into two cases: (1) the situation in which leases are available on a wide variety of assets under roughly similar terms, and (2) the situation in which leases are available on only a few assets under widely varying terms.[1] In the former case, leasing may be viewed as a continuing source of finance which has an optimal proportion in the capital structure. Leasing is, therefore, considered to be a debt-surrogate, and Findlay recommends the use of Equation (34) to make the lease-or-borrow decision. In the latter case, leasing is not viewed as a regular source of finance but rather as a "one-time bargain purchase."[2] As such, Findlay suggests the application of his net present value model given by Equation (26).

The reason for this dual approach to lease analysis is that Findlay considers the important risk element to be different in the two decision scenarios. In the first situation, financial risk is the main concern since the decision involves a choice between two significant components of the capital structure. As pointed out in the discussion of his NPV model, Findlay suggests that the IRR summary measure is better able to deal with financial risk differences than the NPV approach. If investors consider lease and debt financing to be equivalent, and business risk is constant, ρ_t may be compared directly with the after-tax debt rate r_t. On the other hand, Findlay suggests that if investors view leasing as having no impact on the risk of the firm, ρ_t may be compared with the after-tax cost of capital k_t. Finally, he notes that if the suppliers of capital view leasing as adding some risk to the firm but not as much as debt, the equilibrium marginal ρ_t

---

[1] Ibid., pp. 12-13. [2] Ibid., p. 13.

would lie somewhere between r_t and k_t.[1] In Findlay's opinion, it is this last possibility that cannot be analyzed properly by NPV models. As a result, he suggests the use of his NPV model for the second decision scenario.

In this second decision situation, Findlay views the financial risk element as a minor concern because leasing is not considered to be an important component of the capital structure. Leasing is viewed as an infrequent method of obtaining assets on favorable terms. As such, investment or business risk is the major factor in the decision. The adjustment for business risk is made through the use of certainty equivalent and risk adjustment coefficients applied to the salvage value and operating expense terms. The decision in this instance is one of lease versus purchase rather than the lease versus borrow approach of the IRR methods.

Findlay's dual analysis method represents a unique attempt to deal with the different aspects of risk involved in a leasing decision. Quite a different approach to the risk problem is represented by Roenfeldt and Osteryoung's model.[2]

---

[1] Ibid., p. 12. Here, of course, Findlay is referring to the incremental financial risk added to the firm by increasing the debt-to-equity ratio (where lease commitments are included as debt). He notes that if leasing does not add as much risk to the firm as debt, the capital structure will be able to contain more total nonequity financing than would otherwise be the case. Thus, ρ_t will lie between r_t and k_t in equilibrium.

[2] Rodney L. Roenfeldt and Jerome S. Osteryoung, "Analysis of Financial Leases," Financial Management 2 (Spring 1973): 74-87. It should be noted that Wyman has suggested another unique approach to risk analysis using computer simulation in an IRR framework. See, Harold E. Wyman, "Financial Lease Evaluation Under Conditions of Uncertainty," Accounting Review 48 (July 1973): 489-93.

The Roenfeldt and Osteryoung model

This approach represents a departure from the traditional IRR methodology. The internal rate of return models considered thus far all represent variants of Equation (29). The Roenfeldt and Osteryoung (R & O) model, on the other hand, differs from the traditional approach because of its use of risk-adjustment or certainty-equivalent coefficients.[1]

The development of the model is based on three assumptions. First, it is assumed that the firm's present capital structure is optimal and that the firm will continue to pursue the policy of maintaining an optimal structure. Second, financial risk is assumed to be constant between the two alternatives of lease and debt financing. Finally, noneconomic advantages or disadvantages of leasing versus borrowing are ignored.[2]

The R & O model is given by Equation (35):

$$0 = A_0 - \sum_{i=1}^{n} \frac{R_i}{(1+\rho_t)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+\rho_t)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1+\rho_t)^i}$$

$$+ \sum_{i=1}^{n} \frac{\psi_i O_i (1-t)}{(1+\rho_t)^i} - \frac{\lambda_n V_n}{(1+\rho_t)^n} \qquad (35)$$

where ψ_i and λ_n have the same meaning as in Findlay's Equation (26). The coefficient ψ_i is a risk-adjustment factor which takes on values equal to or greater than 1.00 and varies directly with the risk of O_i. The certainty equivalent coefficient λ_n varies between 0 and 1.00 and is inversely related to the risk of V_n. Roenfeldt and Osteryoung employ

[1] Roenfeldt and Osteryoung, p. 79. [2] Ibid., p. 78.

these coefficients to adjust for the investment risk associated with O_i and V_n. In the special case in which O_i and V_n are riskless, ψ_i and λ_n would assume values of 1.00, and Equation (35) reduces to the traditional model given by (29).

The absence of these coefficients from the previously discussed versions of the traditional approach indicates that these models fail to account for the investment risk component of the decision. The operating savings and salvage value enter these equations unadjusted for risk. It will be recalled that this failure to consider investment risk is Findlay's major criticism of IRR models. However, Findlay also finds fault with Roenfeldt and Osteryoung's treatment of financial risk.[1] He notes that the R & O model assumes an equivalence of financial risk between lease and debt financing.[2] As such, the ρ_t generated by Equation (35) is compared directly with r_t. However, the model does not allow for the possibility that investors may perceive less risk with lease financing than with debt. (In this instance, the equilibrium marginal ρ_t will lie somewhere between the after-tax debt rate and the cost of capital.) In essence, the R & O approach holds financial risk constant while adjusting for business risk through the use of the coefficients ψ_i and λ_n. Thus, in Findlay's view, the Roenfeldt and Osteryoung method is analytically equivalent to his own net present value model.[3]

---

[1] Findlay, p. 15.

[2] It should be pointed out that this assumption is implicit in all models which compare the interest cost of leasing with the debt rate.

[3] This may be seen by comparing Equation (35) with Findlay's Equation (26).

Findlay's criticism may be of little practical importance, however, given the earlier discussion of the accounting treatment of leases. The available evidence tends to support the position that investors view lease and debt financing as equivalent. As a result, the assumption of financial risk equivalence inherent in the R & O and traditional models does not appear unreasonable.

A second criticism may be leveled against the R & O methodology. This concerns their use of an ex ante investment analysis which assumes the asset will be purchased with cash. It has been pointed out previously that this approach may lead a firm to reject a particularly attractive lease. Indeed, this problem is endemic to all IRR models. It results from the fact that IRR approaches deal only with the financing aspect of the decision. As such, a separate analysis must be performed to determine the investment worthiness of the asset.

The more appropriate approach would be to perform the investment analysis after it has been determined whether leasing or borrowing is the lowest cost method of finance. In this way, the cash flows appropriate to the preferred financing method can be employed in the discounted cash flow investment analysis. If it is determined, for example, that a purchase with debt capital is preferred, Johnson and Lewellen's Equation (19) may be employed for the investment decision. Similarly, if the lease option is selected, Johnson and Lewellen's Equation (20) would be appropriate.[1]

---

[1] Of course, Johnson and Lewellen's use of r_t to discount R_j and tR_j in Equation (20) is a point of contention among financial theorists. Many firms may wish to substitute k_t as the discount rate for these terms in order to maintain consistency with Equation (19). Johnson and Lewellen's defense of this dual discount rate approach will be found in their "Reply," pp. 1026-27.

Summary and conclusions: IRR methodologies

It has been demonstrated that there is a good deal of similarity among internal rate of return methodologies. Most published models represent variations of the traditional approach. Indeed, even the Roenfeldt and Osteryoung certainty-equivalent method reduces to Equation (29) as a special case. Findlay's approach represents a conceptual departure from the traditional model, but the practical importance of this deviation may be minimal. In most instances, Findlay's Equation (34) will lead a firm to the same decision as Equation (29).

Perhaps the more important contribution of Findlay's paper is that it focuses attention on the differential risk elements in leasing analyses. The hybrid nature of lease versus purchase decisions requires a consideration of both financial and business risk. Findlay's dual analysis approach is an important step toward the development of a procedure which deals effectively with both types of risk.

The important practical advantage of the internal rate of return method appears to be its simplicity. IRR models avoid the problem of selecting the appropriate discount rates, and they are easily interpreted by business decision makers. The discount rate advantage may be illusory, however, since some means of dealing with the investment risk associated with O_i and V_n must be found. The use of Roenfeldt and Osteryoung's adjustment factors still presents a firm with the practical problem of estimating their values. Findlay's suggestion that ψ_i and λ_n may be viewed as functions of the appropriate beta coefficients provides

theoretical insight, but it begs the practical question of how the proper functional forms may be estimated.[1]

A second concern with IRR methods is the assumption that 100 percent debt financing is the only alternative to leasing. As Schall points out, full debt financing may not be optimal from the standpoint of shareholder wealth maximization. It is possible for the purchase to be financed with some mix of new debt or equity, the reduction of current dividends, or the use of cash which would otherwise be retained in the firm.[2] Internal rate of return methods are simply incapable of dealing with these other financing options.

A related issue is the use of an ex ante investment analysis which assumes that the asset will be purchased. This problem arises because IRR models deal only with the financing aspect of the lease-purchase decision. As a result, a separate analysis must be performed to determine the investment worthiness of the asset. If the analysis is conducted under the assumption of a cash purchase, however, a favorable leasing opportunity may be foregone. The more appropriate technique is to determine the lowest cost method of financing via the internal rate of return method and then to determine the investment worthiness of the selected alternative using either Equation (19) or (20).

One final concern with IRR approaches relates to the reinvestment rate problem. Internal rate of return methods assume that intermediate cash flows are reinvested at the internal rate of return. Net present value models, on the other hand, assume that the intermediate flows are reinvested at a rate equal to their respective discount factors.

---

[1]Findlay, p. 9n. [2]Schall, "Lease-or-Buy," p. 1203n.

Generally, theorists tend to favor the use of NPV approaches.[1] Net present value has the virtue of consistency in that the same reinvestment rate assumptions are applied to each decision situation. It is pointed out that with IRR techniques the implied reinvestment rate varies depending upon the interest cost of the lease. It is also noted that only by chance will the internal rate of return equal the actual reinvestment rate.[2] However, this is also true of net present value models. There is no guarantee that the discount rates applied to the cash flows in a NPV leasing model will equal the appropriate reinvestment rates.[3]

---

[1]Van Horne, 3rd ed., p. 81. [2]Mitchell, p. 309.

[3]Beechy, "Cost of Leasing," p. 773.

CHAPTER IV

SURVEY DESIGN AND METHODOLOGY

The Research Objective

The purpose of the survey is to determine what financial analysis methodologies are currently employed by large industrial firms to make lease versus purchase decisions. This information will then be used to develop hypotheses concerning normative marketing strategies for firms involved in industrial leasing. In this sense, the survey may be classified as exploratory research, since its objective is the generation and clarification of hypotheses.[1] As Zaltman, Pinson, and Angelmar point out,

> the nature of the exploratory mission is to clarify existing ideas about relations among concepts and perhaps discover new hypotheses. This is useful when the state of available evidence is internally contradictory or insufficient to permit the statement of formal hypotheses or the detection of new concepts.[2]

As discussed earlier, the dearth of research in this area makes it difficult to construct highly specific hypotheses with regard to lease marketing strategies. It is felt that a first step toward a greater understanding of industrial leasing must include an analysis of the current state of the art in lease analysis methodologies.

---

[1]Gerald Zaltman, Christian R. A. Pinson, and Reinhard Angelmar, Metatheory and Consumer Research (New York: Holt, Rinehart, and Winston, 1973), p. 17.

[2]Ibid.

Hypotheses

The general research hypotheses which guided the design of the survey are:

H_1: The most widely used lease-purchase analysis methodologies among large industrial firms are the conventional net present value method and the traditional internal rate of return method.

H_2: Sophisticated lease-purchase analysis methods are used by relatively few large industrial concerns.

H_3: The majority of large industrial firms view lease versus purchase analysis as a financing decision.

The first two hypotheses reflect the persistence of the conventional NPV and traditional IRR methods in contemporary textbooks, as well as the modest adoption rate of managerial technology by American industry. A second consideration is the difficulty in operationalizing many of the more sophisticated analysis models which have been developed in recent years. The conventional and traditional models represent generalizations of widely used capital budgeting techniques. As such, they are easily understood by top management and are also easily justified by middle management technicians.

The third hypothesis follows directly from the first two. It was pointed out in Chapter III that the choice of a lease analysis model is largely a function of one's conceptual orientation. That is, an analyst's view of the leasing problem should determine whether his methodology is couched in terms of a financing decision, an investment decision, or a combination of the two. The lease-as-debt approach of contemporary financial texts, as well as the intuitive appeal of the debt-surrogate argument leads to the assumption that most firms view leasing as an alternative means of finance.

The Sample

The sample consisted of the 200 largest industrial firms in the United States listed by Fortune magazine.[1] The Fortune 200 was chosen in order to obtain a cross-section of large industrial firms representing various industries and varying degrees of leasing activity.[2] Given the exploratory nature of the study, it was felt that a survey of the larger, more sophisticated industrial firms was the most appropriate. Additionally, a major concern of this study was the attainment of a reasonable response rate. It was believed that larger firms would have the time, the willingness, and the capability to respond to the survey. Underlying this belief is the assumption that larger firms have more at stake in the area of leasing decisions and would, therefore, show greater interest in the survey. Finally, the Fortune 200 represents a major segment of the potential market for industrial leases. With the possible exception of the larger firms in the transportation industry, the sample includes most of the largest lessees and potential lessees in American industry.

It was felt that a nonprobability sample was appropriate, given the low anticipated response rate and the nature of the research hypotheses. While a probability design would have benefits in terms of external validity, it was believed that these advantages would largely be negated by nonresponse bias. In addition, the hypotheses are such

---

[1] "The 500 Largest Industrial Corporations," Fortune 89 (May 1974): 232-39.

[2] Research by Wehle indicates differences in the motivation for leasing between lessees classified as intensive and nonintensive. See, Wehle, pp. VI-1 to VI-57.

that sophisticated statistical analyses requiring probability samples are not necessary.

One of the more difficult tasks facing the researcher in industrial buyer behavior studies is the identification of the relevant buying center and the specific members of that group.[1] In the present study, the task was to identify the appropriate analyst-influencer in the lease buying group. This was accomplished by sending the research instrument to the chief financial officer of the firm and asking him to forward it to the person or department responsible for lease-purchase analyses. It was also hoped that by obtaining top level cooperation with the study a higher response rate would be achieved.

The Research Instrument

The research instrument consisted of a lease case problem and a questionnaire. Also included in the packet was a cover letter and a set of instructions. A copy of the research instrument has been included as Appendix A.

The respondents were asked to analyze the case problem using the methodology they would normally employ for financial leasing decisions.[2] The case itself is a modified version of the Johnson and Lewellen problem introduced in Chapter III. The Johnson and Lewellen figures were multiplied by a factor of 20 and a number of assumptions

---

[1] Webster and Wind, p. 35.

[2] A similar approach was employed by Vancil and Anthony in their well-known 1959 survey. They sent case problems to financial institutions in order to determine the methodologies used to evaluate the lease commitments of firms from an investment standpoint. See, Vancil and Anthony, pp. 31-41.

were changed so that the case could be analyzed using any of the methodologies existing in the literature.

It was believed that the case approach provided the best vehicle for obtaining the type of information required by the study. The use of a hypothetical case problem offers the advantage of comparability across respondents without the danger of compromising any proprietary data of the firms. In addition, the use of a case problem allows for a larger and more geographically dispersed sample than would be possible through personal interviews. Every effort was made to insure that the case was not biased in favor of any specific methodology. Respondents were instructed to employ their normal lease analysis method and to ignore any data which were not relevant to that method.

The accompanying questionnaire was designed to develop data for a respondent profile and to obtain information relevant to the case analysis. The profile questions focused on such things as the respondent's position within the firm, the industry classification of the company, its sales volume, and the dollar value of its annual lease commitments. Two questions were included to assist in the analysis of the returned case problems. The first required the respondents to indicate the decision (lease, purchase, or indeterminate) generated by their methodology. The second asked them to cite the source of their analysis model. Finally, the analysts were asked if they considered the lease-purchase problem to be a financing decision, an investment decision, or a combination of the two. This question was designed to test the third research hypothesis and also provided a check for consistency with the firm's analysis method.

The instrument was pretested by eliciting the comments of experts in the field of leasing. These individuals included the executive secretary of a large lessor trade association, the vice president in charge of leasing for a major midwestern bank and the head of financial analysis for a large public utility. In addition, extensive discussions were held with various leasing executives at the American Association of Equipment Lessors Annual Seminar at the University of Notre Dame. As a result of these discussions, a number of changes were made in the case problem before it was sent to the respondents.

Methods Used to Increase the Response Rate

A low response rate was anticipated, given the nature of the survey and the amount of time required to complete the case analysis and questionnaire.[1] As a result, various techniques were employed in an effort to increase the number of returns. Some of these techniques have already been mentioned. Other methods included the use of preaddressed business reply envelopes for the return of the instrument, an offer of the survey results to respondent firms, and assurances of anonymity for all participants. In addition, every effort was made to simplify the case and questionnaire in order to reduce the time required to prepare a response. All correspondence with the firms was nonpersonalized in the belief that this would have a favorable effect on response rate. While the empirical research on personalization has shown mixed results, it is clear that for some populations a

---

[1]For example, Vancil and Anthony achieved only a 10 percent return in their survey. Ibid., p. 32.

nonpersonalized instrument improves the return rate.[1] It was felt that frequently surveyed groups, such as the Fortune 200, would be more likely to respond to a nonpersonalized contact. Finally, a follow-up reminder letter (Appendix B) was sent to the sample approximately one month after the initial mailing.

---

[1]See, for example, Ramond Simon, "Response to Personal and Form Letters in Mail Surveys," Journal of Advertising Research 7 (March 1967): 28-30; Alan Andreason, "Personalizing Mail Questionnaire Correspondence," Public Opinion Quarterly 34 (Summer 1970): 273-77; Eli P. Cox III, W. Thomas Anderson, Jr., and David D. Fulcher, "Reappraising Mail Survey Response Rates," Journal of Marketing Research 11 (November 1974): 413-17; and Michael J. Houston and Robert W. Jefferson, "The Negative Effects of Personalization on Response Patterns in Mail Surveys," Journal of Marketing Research 12 (February 1975): 114-17.

CHAPTER V

SURVEY RESULTS AND CONCLUSIONS

The Respondent Profile

Returns were received from 63 companies, a response rate of 31.5 percent. Tables 6 through 10 present a profile of the respondent firms. As can be seen from Table 8, the dominant participants in the study are the larger firms among the Fortune 200. The 57 corporations which chose to identify themselves represent a combined 1974 sales volume in excess of $215 billion. The median sales of these firms is in the neighborhood of $2 billion.

TABLE 6

LEVEL OF RESPONDING DEPARTMENT WITHIN THE COMPANY

Department	Number of Firms
Corporate headquarters	61
Division	2
Subsidiary	0
TOTAL	63

TABLE 7

DISTRIBUTION OF RESPONDENTS BY INDUSTRY CLASSIFICATION

Classification	Number of Firms
Conglomerate	12
Agriculture, Forestry	2
Mining, Petroleum Refining	11
Manufacturing, Construction	23
Transportation, Communication	1
Other	14
TOTAL	63

TABLE 8

CLASSIFICATION OF RESPONDENTS ACCORDING TO FISCAL 1974 SALES VOLUME

Sales Volume	Number of Firms
$2.5 billion and over	27
$1.5-$2.5 billion	24
$1.1-$1.5 billion	8
$800 million-$1.1 billion	4
Less than $800 million	0
TOTAL	63

TABLE 9

NUMBER OF RESPONDENTS REPORTING
LEASING ACTIVITY

Status	Number of Firms
Lease	59
Do Not Lease	3
TOTAL	62

TABLE 10

DISTRIBUTION OF RESPONDENTS BY DOLLAR VALUE
OF 1974 LEASE PAYMENTS

Dollar Value	Number of Firms
$100 million or over	4
$50-$100 million	10
$25-$50 million	15
$10-$25 million	15
Less than $10 million	13
TOTAL	57

A total of 57 respondents indicated that they employ a formal financial analysis methodology in making lease versus purchase decisions. Four firms stated that they do not use a formal method, and two firms did not respond to this question. The lease-purchase analysis was considered to be a financing decision by 45 companies. None of the responding firms viewed the analysis as a pure investment decision; however, 14 companies considered it to be both a financing

and investment decision, and four respondents did not express an opinion. These data are summarized in Tables 11 and 12.

TABLE 11

NUMBER OF RESPONDENTS REPORTING USE OF FORMAL FINANCIAL ANALYSIS METHOD FOR EVALUATION OF LEASING DECISIONS

Analysis Method	Number of Firms
Do Employ Formal Method	57
Do Not Employ Formal Method	4
TOTAL	61

TABLE 12

RESPONDENTS' VIEW OF THE LEASING DECISION

Type of Decision	Number of Firms
Financing Decision	45
Investment Decision	0
Both Financing and Investment Decision	14
TOTAL	59

Approximately 57 percent of the individuals who completed the questionnaire are members of a corporate financial analysis department. Another 30 percent of the individuals are associated with the office of the corporate treasurer or comptroller. The remainder of the respondents are from various departments including accounting, facilities management, and purchasing.

Results of the Case Analysis

Of the 63 respondents, 53 submitted analyses of the lease versus purchase case problem. Two of the firms employed two different analysis methods. Since these companies indicated that they regularly applied both models to lease-purchase decisions, a total of 55 methods were available for classification. Unfortunately, documentation problems made it impossible to interpret seven of the analyses. The 48 remaining methodologies are classified in Table 13.

TABLE 13

CLASSIFICATION OF RESPONDENTS' LEASE VERSUS PURCHASE ANALYSIS MODELS

Models	Frequency of Methodology
Traditional IRR Model	24
Conventional NPV	11
Bierman and Smidt Model (1966)	5
Basic Interest Rate Model	4
Weston and Brigham Model (1972)	2
Bower, Herringer, and Williamson Model	2
TOTAL	48

The traditional IRR and conventional NPV models are, by far, the most popular approaches among the respondents. Over 70 percent of the classified analyses fall into one of these two categories. The Bierman and Smidt and the revised Weston and Brigham models are employed by a total of seven firms. It will be recalled that these models were shown to be mathematically equivalent in Chapter III. Similarly, the Basic Interest Rate approach and the BHW method, which

were also demonstrated to be virtually identical, are used by a total of six of the respondents.

The decision to lease or purchase based on the case analysis was quite consistent across the methodologies. Unfortunately, various computational errors made it impossible to compare the decisions of all the respondents. Of the 38 comparable analyses, 36 firms chose to purchase the asset, one firm chose to lease, and one company indicated that the decision was indeterminate. Only in the case of the firm which chose leasing was the decision inconsistent with the results generated by the analysis model. The respondent who indicated that the decision was indeterminate stated that a final decision would be influenced by other qualitative factors. It should be noted that a number of other companies qualified their lease-purchase choice by pointing out that "other factors" would be taken into consideration in a real-world setting. This is, of course, consistent with Wehle's findings that various financial and nonfinancial concerns affect the lease decision.[1]

The results of the case analysis appear to be in accord with the general research hypotheses of Chapter IV. The first hypothesis posited that the conventional NPV and traditional IRR models are the most widely used lease-purchase analysis methods among large industrial concerns. Given that over 70 percent of the classified methodologies fall into one of these two categories, it would appear that the evidence is quite consistent with this hypothesis.

---

[1]Wehle, pp. V-1 to V-32.

The assumption of the second hypothesis is that sophisticated analytical models are employed by relatively few major industrial firms. Once again, the data are consistent with this conclusion. None of the respondents attempted to apply the more recently developed models of Johnson and Lewellen, Schall, Findlay, Wyman, or Roenfeldt and Osteryoung. Indeed, only two of the respondents employed a model developed later than 1966.

The data also tend to support the third hypothesis, which postulated that the majority of large industrial corporations view lease-purchase analysis as a financing decision. Over 76 percent of the firms responding to this question indicated that they considered lease versus purchase to be a financing decision (see Table 12). The remaining firms view the analysis as both a financing and investment decision.

The fact that a large majority of the respondents view the leasing problem as a decision involving alternative means of finance has important implications for lease marketing. The assumption that lease-or-purchase is a pure financing decision implies that a separate investment analysis must be performed to determine if the asset itself is worth acquiring. As noted in Chapter III, however, an ex ante investment analysis which assumes the asset will be purchased may cause the firm to overlook a bargain leasing opportunity. Of the 53 firms which submitted case analyses, 20 performed an ex ante investment analysis (assuming purchase of the asset) and 5 firms simply assumed that such an analysis had already been performed. These figures are particularly significant, since the respondents were not required to consider the investment aspects of the case. Undoubtedly, the number

of ex ante investment analyses would have been higher if specific mention of the investment element had been made in the case instructions.

An ex ante investment analysis which assumes that the asset will be purchased results in a clear bias against leasing. If the purchase option does not generate a profitable return, it is assumed, a priori, that the lease will be unprofitable. However, Johnson and Lewellen have demonstrated that this may not be the case.[1] If the lease rate is sufficiently low, acquisition of the asset may be a profitable investment under the lease but may be unprofitable if the asset is purchased. Thus, models which require a prior investment analysis under the assumption of ownership tend to underestimate the economic advantages of leasing. With the exception of the Bierman and Smidt approach, all of the methodologies listed in Table 13 fall into this category. There is, however, another type of bias which is endemic to these approaches. In the following section, the source of this bias will be examined and its implications for lease marketing will be discussed.

Implications for Lease Marketing

In Chapter II, it was suggested that an important opportunity may exist for lease marketers to educate industrial firms to lease-purchase models which more accurately reflect the financial advantages of leasing. The results of the survey tend to confirm the existence of this market opportunity. Most of the respondent firms employ methods of analysis which do not properly adjust for the risk element in the

---

[1] Johnson and Lewellen, "Reply," p. 1025.

decision. This failure to adjust correctly for risk tends to underestimate the true economic advantages of leasing, thus biasing these models in favor of the purchase option.

Net present value approaches which fail to make a proper adjustment for risk include the conventional model, the Basic Interest Rate model, and the Bower, Herringer, and Williamson model. Approximately one-third of the classified methodologies fall into one of these three categories. As was pointed out in Chapter III, the basic problem with these approaches is their use of the cost of capital to discount relatively risk-free cash flows.

The reason that this factor tends to favor the purchase option may be seen by comparing Weston's and Brigham's 1972 model (17) with the adjusted version of their earlier approach (6").[1] As mentioned previously, Equation (6") is probably the most widely known version of the conventional methodology:

$$NAL = \sum_{i=1}^{n} \frac{L_i}{(1+k_t)^i} - \sum_{i=1}^{n} \frac{R_i}{(1+k_t)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+k_t)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1+k_t)^i}$$

$$- \sum_{i=1}^{n} \frac{tI_i}{(1+k_t)^i} + \sum_{i=1}^{n} \frac{O_i(1-t)}{(1+k_t)^i} - \frac{V_n}{(1+k_t)^n} \qquad (6")$$

The only difference between this model and the 1972 revision is that the latter employs r_t rather than k_t to discount the contractual and tax-shield cash flows:

---

[1] Recall that in Chapter III Weston's and Brigham's 1966 model was adjusted by the addition of $O_i(1 - t)$ and V_n in order to compare the various approaches.

$$NAL = \sum_{i=1}^{n} \frac{L_i}{(1+r_t)^i} - \sum_{i=1}^{n} \frac{R_i}{(1+r_t)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+r_t)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1+r_t)^i}$$

$$- \sum_{i=1}^{n} \frac{tI_i}{(1+r_t)^i} + \sum_{i=1}^{n} \frac{O_i(1-t)}{(1+r_t)^i} - \frac{V_n}{(1+r_t)^n} \qquad (17)$$

The higher discount rate applied to these terms by (6") favors the purchase because the "costs" of a lease tend to outweigh its "benefits" in the early years of the asset's life. These costs include the lease payments, the foregone tax shields resulting from depreciation and interest, and the sacrifice of the asset's salvage value. The benefits include the loan payments and after-tax operating expenses avoided by leasing, as well as the tax shield provided by the lease rentals. Because of the use of accelerated depreciation and the annuity method of calculating loan interest, the costs of leasing will generally exceed the benefits in the earlier years; and a relatively high discount rate such as k_t will tend to give excessive weight to these costs. Thus, Equation (6") frequently generates a negative net present value advantage of leasing (see Table 5). Similarly, Vancil's Basic Interest Rate method and the BHW model will tend to favor the purchase option because of their use of k_t as a discount rate.

On the other hand, the low rate of discount employed by Equation (17) gives relatively more weight to the later years of the asset's life when the benefits of leasing frequently outweigh its costs. As a result, the revised Weston and Brigham model (and its equivalent, the 1966 version of the Bierman and Smidt approach) are more favorable toward leasing. This is demonstrated in Table 5, in

which Equation (17) is the only methodology which generates a positive present value for the Johnson and Lewellen problem.

From a theoretical standpoint, the use of a discount rate in the vicinity of r_t more accurately reflects the true economic advantages of leasing. It was pointed out in Chapter III that the relative certainty of the contractual and tax-shield flows warrants a rate of discount which is below the firm's cost of capital. For practical purposes, the use of the firm's after-tax debt rate represents a reasonable approximation of the appropriate rate.

Of course, the Weston and Brigham and Bierman and Smidt models are not the only net present value approaches which adjust for the differential risk element in the lease-purchase decision. Johnson and Lewellen, Schall, and Findlay all attempt to account for risk difference in their analyses. The advantages and disadvantages of each of these approaches were discussed in Chapter III. The attempt here is not to recommend an ideal methodology, but rather to suggest that certain models are better able than others to reflect the financial advantages of leasing. In this regard, the more recently developed models of Weston and Brigham, Schall, and Findlay are clearly superior to the conventional, BIR, and BHW approaches employed by many of the respondents.

In a similar fashion, the internal rate of return model developed by Roenfeldt and Osteryoung is more effective in dealing with risk than the traditional IRR approach. If O_i and V_n are considered to be relatively risky cash flows, the traditional model given by Equation (29) will tend to overestimate the cost of leasing:

$$0 = A_o - \sum_{i=1}^{n} \frac{R_i}{(1+\rho_t)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+\rho_t)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1+\rho_t)^i}$$

$$+ \sum_{i=1}^{n} \frac{O_i(1-t)}{(1+\rho_t)^i} - \frac{V_n}{(1+\rho_t)^n} \qquad (29)$$

This results because O_i and V_n enter the equation unadjusted for investment risk. On the other hand, Roenfeldt and Osteryoung adjust for the riskiness of these terms by applying the coefficients ψ_i and λ_n:

$$0 = A_o - \sum_{i=1}^{n} \frac{R_i}{(1+\rho_t)^i} - \sum_{i=1}^{n} \frac{tD_i}{(1+\rho_t)^i} + \sum_{i=1}^{n} \frac{tR_i}{(1+\rho_t)^i}$$

$$+ \sum_{i=1}^{n} \frac{\psi_i O_i(1-t)}{(1+\rho_t)^i} - \frac{\lambda_n V_n}{(1+\rho_t)^n} \qquad (35)$$

where $\psi_i \geq 1.00$ and $0 \leq \lambda_n \leq 1.00$.

In many practical situations, the effect of these adjustments may be minimal. For example, if O_i consists of highly predictable fixed costs and V_n is a small proportion of A_o, the coefficient ψ_i will equal 1.00 and $\lambda_n V_n$ will be too small to have a major impact on ρ_t. However, there may be instances in which the magnitude and riskiness of these variables will be sufficient to drive ρ_t below r_t. (This may be the case in high technology industries in which the expected salvage value of the asset is purely a matter of conjecture.) In such situations, the traditional model will clearly overstate the after-tax cost of leasing. As a result, an important opportunity exists for lease marketers to introduce potential customers to a risk-adjusted form of the IRR approach. This appears to be a particularly attractive

opportunity in light of the fact that one-half of the survey respondents employ the traditional rate of return methodology.

The marketing financial analyst

The results of the survey and the review of the lease analysis literature make it clear that there is potential in pursuing a lease marketing strategy which focuses on the buying technologies employed by lessees. A properly presented financial analysis model which accurately portrays the economic benefits of leasing may have a major impact on a firm's lease-or-purchase decision. The most significant problem faced by lessors in implementing this strategy appears to be one of selecting and training the appropriate sales personnel.

Manufacturer lessors may have difficulty in this regard because their present sales force may not have the background, training, and expertise to make effective financial presentations. The sales representative required for this task must be able to interface with controllers, accountants, tax specialists, and financial analysts. He must possess strong communications skills and have a solid background in corporate finance, accounting, and financial analysis. In short, a new type of marketing specialist is required: the marketing financial analyst.

The marketing financial analyst would operate as part of a sales team and would have the responsibility of "selling" the economic benefits of leasing. The team concept is not new. Many industries employ sales teams which consist of both account managers and technical specialists. The computer industry, for example, uses applications specialists who make presentations on the problem-solving capability

of various systems. Oftentimes these specialists work directly with a customer's systems group in order to ensure a smooth transition to the new hardware and software.

In a similar manner, the marketing financial analyst would make presentations to relevant members of the buying center. He would also work directly with the firm's financial organization in determining the economic impact of the lease-purchase decision. By working with the financial group, he would be able to analyze the firm's current buying technology and suggest alternative methodologies which accurately reflect the costs and benefits of the lease and purchase options.

For optimal efficiency, it would be desirable for the marketing financial analyst to have the capability of adapting to the specifics of the situation. For example, if the lessor is faced with stiff price competition on a particular order, the analyst may be given limited authority to adjust the lease rate or the terms of the contract in order to obtain the account.[1] This flexibility may allow the lessor to gain a competitive advantage over firms which require corporate or division level approval of similar changes. Having a financial analyst in the field would enable the firm to adapt more rapidly to changing circumstances which may arise during the negotiation stage of the industrial purchasing process.

As the degree of autonomy of the marketing financial analyst increases, however, the question of control becomes more significant. For example, if the analyst reports directly to field sales management,

---

[1]Of course, guidelines must be developed to insure that such changes do not violate the Robinson-Patman Act.

he may develop a tendency to adjust the terms of the lease contracts to maximize sales at the expense of profit. This is particularly true if, as is so often the case, the sales organization's performance is measured in terms of orders and revenue. One possible solution to this problem is to maintain the marketing analysts under the direct control of the chief financial officer. They would then advise field sales management in a staff capacity. This organizational arrangement would allow the corporate or division level financial group to exert an influence on the activities of the field analysts. Periodic rotation for home office assignments may also be helpful in minimizing the sales orientation of the analysts. A subsidiary benefit of this approach may be to improve the working relationship between the sales and financial organizations.

Many non-manufacturer lessors may also find the marketing financial analyst approach to be highly relevant to their sphere of operations. Expansion of this segment of the industry will increasingly depend on the active promotion of the economics of leasing. Traditionally, independent and bank lessors have been less than aggressive in their marketing of leases. For example, many banks operate their leasing departments strictly on a referral basis from commercial loan officers. In addition, much of the promotional literature of non-manufacturer leasing firms suggests a lack of appreciation for the relevant economic benefits of leases. Many of their brochures feature highly questionable advantages and present analytical models which violate the fundamentals of financial theory. It appears that these firms would have much to gain by adopting the marketing financial analyst approach.

As the survey results suggest, the opportunity exists to raise the awareness levels of industrial consumers vis-á-vis the financial advantages of leasing.[1] The use of highly trained marketing financial analysts would allow lessors to introduce potential customers to more advanced lease analysis models. To the extent that a given lease contract results in an economic advantage to the lessee, both parties to the transaction gain. Indeed, in the absence of any significant market imperfections, a more efficient allocation of resources should result.

The impact of leasing on the marketing mix of manufacturers

Manufacturers who offer their products for both sale and lease will find that leasing has a major impact on their marketing mix strategies. For example, the firm's promotional program must be redirected to communicate, not only the technical advantages of the product, but also the economic advantages of leasing. This has a significant effect upon the objectives of the promotional campaign, the message strategy, and the promotional media employed. The firm may find it necessary to reallocate a portion of its promotional resources from its traditional targets, such as purchasing agents and engineers, to other participants in the lease-purchase decision process. In particular, the firm will have to identify and reach the relevant analyst-influencers in the financial organization. In addition to communicating the economics of leasing, the firm's message strategy

[1] As noted in Chapter II, Wehle's survey also suggests that industrial firms may be unaware of many of the potential economic advantages of leasing. See, Wehle, pp. VI-1 to VI-57.

must attempt to dispel negative attitudes that buying center members may have concerning leases. In large part, this will require an informational campaign which confronts these issues directly.

Pricing presents a unique problem for the manufacturer-lessor because both a sales price and a lease rate must be determined for the same product. One approach, which is used in a number of industries, is to set the lease rate and purchase price such that they generate the same rate of return over the product's life cycle. Alternatively, the rates may be set so as to encourage either leasing or purchasing. Depending upon the nature of the product and the industry, a manufacturer may feel that a high lease-purchase ratio generates certain marketing advantages. For example, leasing may encourage closer contact between the lessee and the manufacturer's sales force. Such contact may lead to lease renewal business or increased sales of other products in the company's line. In addition, the use of incentives such as lease credits may encourage the lessee to "trade-up" as his capacity or needs require. This technique is used by many computer firms who allow their customers to apply part of the payments on presently leased systems to the purchase or lease of larger systems.

On the other hand, some manufacturers may wish to set relatively high lease rates in order to encourage purchase. Leasing can place a heavy financial strain on a firm. Fruhan estimates that in the computer industry it requires $1.20 in firm capital to support $1.00 in annual shipments.[1] Indeed, it has been suggested that the inability to meet the heavy capital requirements of the industry was one of the major

---

[1]William E. Fruhan, "Pyrrhic Victories in Fights for Market Share," Harvard Business Review 50 (September-October 1972), p. 102.

factors in the decision to abandon the RCA and General Electric computer ventures.[1] Thus, some firms may wish to maintain a low lease-purchase ratio because they feel that they do not have the financial strength to support an expanding lease base.

For a firm with an established lease base, however, the capital drain is not as severe since revenue from outstanding contracts helps to support new lease business. Indeed, a high lease-purchase ratio is said to be an advantage during periods of economic slowdown. This is because the lease base continues to generate revenue even as new orders drop off. The argument may be somewhat overstated, however, since the drop in new orders will tend to reduce the firm's revenue base for the future years.

In addition to affecting the firm's lease base, the business cycle has important implications for lease pricing. During periods of tight money, for example, firms may find it attractive to lease equipment rather than to finance its purchase with costly debt capital. The manufacturer lessor may be able to encourage this tendency by maintaining the effective yield on its leases below the rate on comparable bank term loans. The extent to which a firm will be able to implement such a strategy will depend, in large part, on the price it must pay for capital funds. As such, the larger and more financially sound firms would tend to be at an advantage in this process. In effect, these firms would be acting as wholesalers of capital by issuing securities

---

[1] Ibid.

at relatively low rates,[1] and using the funds to support leases at rates which are competitive with bank debt.

During periods of recovery, lessors may be able to take advantage of changes in the investment tax credit. Changes in this statute are generally made during these periods in order to encourage additional capital investment.[2] As was pointed out in Chapter II, firms with low or heavily sheltered earnings may be unable to use the full amount of the credit. This presents lessors with an opportunity to utilize the credit and pass on a portion of the savings via a lower lease rate. Thus, astute lease pricing may allow a manufacturer to take advantage of economic conditions at both extremes of the business cycle.

Manufacturers may find that leasing also impacts the service and product quality elements of the marketing mix. Wehle found that many firms expect better maintenance and installation service on leased equipment.[3] If these expectations are not fulfilled, the lessor may lose the opportunity for lease renewal business and new orders. In addition, lessees often feel no obligation to make rental payments, and lessors are reluctant to require payment, until the equipment is operating

---

[1]This might include equity issues, bonds, or long-term bank notes.

[2]The investment tax credit was first established in 1962. It was revised in 1964 and subsequently suspended in 1966. In 1967, the ITC was reinstated only to be repealed again in 1969. The present statute was reenacted in 1971 and revised in 1975. See: Ray M. Sommerfield, Federal Taxes and Management Decisions (Homewood, IL: Richard D. Irwin, 1974), p. 165; and P-H Federal Tax Course 1976, par. 2050. Given the checkered history of the tax credit, it appears reasonable to assume that Congress will continue to use it to accelerate recovery during periods of economic slowdown.

[3]Wehle, p. VI-45.

properly at the customer's location. As such, proper installation and basic product quality become important factors in determining the profitability of leased equipment. Indeed, it is not unusual for newly developed computer systems to generate little or no lease revenue during the first months after introduction because of the inevitable problems associated with bringing the systems up to full working capacity.

From the standpoint of long-term profitability, the lessor has a vested interest in maintaining high standards of quality and service. As the product moves through its life cycle, the lease renewal revenue it generates will be in proportion to its expected useful life. Clearly, high quality standards and expert maintenance will allow the manufacturer to stretch the period of useful service. Proper maintenance will also facilitate the sale or lease of the product as second-hand equipment once its original lease has expired. As such, the product may be able to generate a reasonable return through the maturity and decline stages of its life cycle. The sale or lease of reconditioned equipment which has been fully depreciated can result in substantial profits if initial product quality is high and demand is of sufficient magnitude.

In the final analysis, however, the long-term profitability of a manufacturer's leasing program depends upon how well the firm can market the economics of leasing. The theme of this research has been that the lease is essentially a financial device, and that it provides the industrial consumer with a set of benefits which are primarily economic in nature. It has been pointed out that the financial analysis methodologies employed by industrial firms to make lease versus purchase decisions tend to be biased against the lease alternative. As a result,

the overall marketing strategy of the lessor must focus upon communicating the relevant economic benefits to potential lessees. This includes the need to educate these firms to more advanced models of lease analysis. The marketing financial analyst concept is a proposed organizational arrangement which will facilitate this communication process. As suggested earlier, the marketing financial analyst will require the support of the firm's other promotional elements. Informational campaigns employing selective mass media vehicles and direct mail appear to be particularly appropriate for this task. Institutional campaigns in broader distribution print media will also provide support for the firm's lease marketing activities. Finally, the lessor's promotional program must be coordinated with the other segments of the marketing mix. The pricing, product quality, and service elements must ensure that the consumer will realize an economic advantage by entering into the lease contract.

Recommendations for Future Research

The present study has revealed at least three areas for future inquiry. First, there is a clear need for further research on the evaluative criteria employed by industrial firms in making lease versus purchase decisions. More specifically, research should determine which of the alleged advantages of leasing are considered to be true benefits and which are viewed as being illusory. In addition, the relative salience of perceived benefits should be investigated. To date, research in this area has simply catalogued various proposed benefits without actually determining the factors which are truly significant in the leasing decision. The research problem appears to be

particularly well-suited to the application of expectancy-value models. Moreover, the information generated by research of this type would be of great value to lessors in planning their lease marketing strategies.

Lease marketers should also profit from further research on the lease versus purchase decision process portrayed in Figure 1. A majority of the hypotheses which are implicit in the model have not been tested empirically. For example, research could shed additional light on the nature and significance of the analyst-influencer's role in the lease-purchase decision procedure. There is also a need to examine the impact of individual factors such as background, education, and experience on the decision orientation of buying center members. Empirical inquiry would also be useful in determining the external sources of information used in making the decision. Further research on these and the many other issues raised by the lease-purchase decision model will allow lessors to better meet the needs of their industrial customers.

Finally, further theoretical work is required in the development of normative lease versus purchase analysis models. As was illustrated in Chapter III, a good deal of disagreement exists concerning the appropriate analysis procedures. Future work in this area should focus on resolving some of the major points of contention among the more recently developed models. The differences in these approaches are largely a function of the varying conceptual orientations of their authors. Schall's recognition of the lease as a financial hybrid is an important step toward a more precise and rational definition. Hopefully, other researchers will build upon this foundation in an attempt to forge a synthesis in the area of lease analysis methodologies.

APPENDICES

MICHIGAN STATE UNIVERSITY

GRADUATE SCHOOL OF BUSINESS ADMINISTRATION
DEPARTMENT OF MARKETING AND
TRANSPORTATION ADMINISTRATION

EAST LANSING · MICHIGAN · 48824

Dear Sir:

As you know, there is a great deal of disagreement among practitioners and academicians concerning the appropriate methods of analyzing lease versus purchase decisions. The Graduate School of Business Administration at Michigan State University is conducting a survey to determine current corporate practice in this area of decision making. We would greatly appreciate your firm's participation in this survey. In return, we would be willing to send you a copy of the research results.

Enclosed is a hypothetical lease versus purchase case situation and a brief questionnaire. We would like you to forward this material to the person or department responsible for the financial analysis of lease-purchase decisions for the corporation. If your firm decentralizes such decisions at the division level, please forward the case and questionnaire to the domestic division which is most heavily involved in the leasing of capital assets. In the event that your firm does not undertake lease commitments, please have a member of your corporate financial staff fill out the applicable sections of the questionnaire only.

Neither the case nor the questionnaire requires disclosure of any proprietary information concerning your corporation. Nevertheless, you have our assurance that your responses will be kept strictly confidential, and that your firm's name will not appear in any tabulation of results of this research project. If you wish, however, you may return the materials anonymously.

The usefulness of this survey's results to you, as a decision maker, will be directly proportional to the corporate participation we are able to obtain. We, therefore, request your cooperation in this matter.

Sincerely,

William Lazer
Professor of Marketing

Paul Anderson
Graduate Assistant

MICHIGAN STATE UNIVERSITY
GRADUATE SCHOOL OF BUSINESS ADMINISTRATION
LEASING SURVEY

INSTRUCTIONS for CASE ANALYSIS and QUESTIONNAIRE

The purpose of the case and questionnaire is to determine current corporate practice regarding the financial analysis of lease versus purchase decisions. We feel that the best way to accomplish this is to ask you to analyze the enclosed case situation by employing the methodology you would normally use for such situations. (If your firm does not lease capital assets, or if you do not employ a formal analysis methodology for these types of decisions, simply fill out those portions of the questionnaire which apply and return it in the enclosed envelope.)

Please note that neither the case nor the questionnaire requires you to reveal any proprietary information concerning your firm. Nevertheless, we assure you that your responses will be kept strictly confidential, and that your firm's name will not appear in any tabulation of the results of this survey. You may, of course, return the case analysis and questionnaire anonymously if you wish.

Please perform the calculations for the case analysis on your own forms or worksheets, and carefully document each step of your methodology. The case problem has no right or wrong answers and is not intended to be a "typical" lease versus purchase situation. Indeed, many simplifying assumptions have been made in order to make the calculations easier. (For example, all cash flows, with the exception of the purchase price outflow, are assumed to occur at the end of each year.) The numbers are purely hypothetical and do not necessarily represent current economic conditions. In addition, it is not intended that you use all of the data given in the case. Use only that data which you would employ in your normal lease-purchase analyses. If you use a computer program for these types of decisions, please enclose a copy of the output from the program along with an explanation of the program's methodology. Should you have any questions or problems, please call Mr. Paul Anderson at 517-355-4619. The most convenient time would be on Wednesdays or Fridays between 12:30 p.m. and 2:00 p.m. Eastern Time.

After you have completed the case, please fill out the brief questionnaire and return it *and the case analysis worksheets* in the enclosed self-addressed envelope. You may keep all of the other materials for your files. It would be greatly appreciated if you could return the case analysis and questionnaire as soon as possible. If we can obtain your cooperation in this matter, we will be able to send you the results much more quickly.

MICHIGAN STATE UNIVERSITY
GRADUATE SCHOOL OF BUSINESS ADMINISTRATION
LEASING SURVEY

CASE: FINANCIAL ANALYSIS OF A LEASE VERSUS PURCHASE DECISION

Assume that your firm has the option of acquiring a piece of capital equipment for the cash purchase price of *$300,000*. This represents a cash outflow at the *beginning* of the equipment's useful economic life of five years. The pre-tax residual or fair market value of the equipment at the *end* of the fifth year is expected to total *$45,000*.* If the equipment is purchased, it will be *95%* depreciated over its useful life using the sum-of-years digits method (see Schedule 1 below). Pre-tax operating costs of the equipment under the purchase option are expected to be *$40,000* per year.* Operating costs include such things as labor, materials, maintenance, insurance, etc., and are assumed to be cash outflows at the *end* of each year (see Schedule 2 below).

Alternatively, the firm may obtain the use of the equipment by entering into a non-cancelable financial lease with a term of five years. The annual lease rate is *$84,000* payable at the *end* of each of the five years. The lease contract does not provide for a purchase option at the termination of the lease. However, the lessor has agreed to assume a portion of the operating costs of the equipment. These costs, which include such things as maintenance and insurance, are expected to total *$20,000* per year.* As a result, the firm will incur *$20,000* in annual operating costs with the lease compared to *$40,000* if it purchases the equipment (see Schedule 2 below).

Assume that your company expects the equipment to generate new cash revenues of *$175,000* per year as shown in Schedule 3* (considered to be cash receipts at the *end* of each year). Further assume that discussions with the firm's bank reveal that it may obtain a five-year term loan in the principal amount of *$300,000* at an interest rate of *8%* per annum. A repayment schedule for such a loan is shown in Schedule 4 (it is assumed that installment payments are due at the *end* of each year).

Additional assumptions concerning interest rates, capital costs, and taxes are given below:

CAPITAL COSTS, INTEREST RATES, AND THE REINVESTMENT RATE

1. The firm's cut-off rate for capital investment decisions (i.e., the corporation's *after-tax* weighted average cost of capital) = *12%*

2. The firm's cost of intermediate term debt capital (i.e., the rate of interest on a bank term loan available to the corporation) = *8% (pre-tax)* and *4% (after-tax)*

3. The current "riskless" rate of interest (approximated by the *pre-tax* rate of return the firm could earn by investing in U.S. Government securities) = *6%*

4. The company's average *after-tax* reinvestment rate (i.e., the average rate of return on new investments which the firm expects to earn over the next five years) = *12%*

TAX RATES AND TAX ASSUMPTIONS

1. The firm's average and marginal income tax rate = *50%*

2. The tax rate applicable to gains and losses on the disposal of fixed assets = *30%*

3. The applicable effective rate under the investment tax credit is *4.667%* or *$14,000 (4.667%* of *$300,000)*

   a. Assume that sufficient income from other sources exists such that the full amount is taken as a credit against taxes in the first year of the equipment's life under the purchase option
   b. Assume that the lessor will not allow the firm to claim the ITC (as allowed by Section 48(d) of the Internal Revenue Code) if the equipment is leased

4. Assume that all taxes represent cash outflows at the *end* of each year

5. Ignore all state and local taxes as well as all federal excise taxes

6. Assume the lease is recognized by the I.R.S. as a true lease as specified in Section 162(a)(3) of the Internal Revenue Code and Revenue Ruling 55-540 so that the full amount of the lease payments qualifies as a tax deduction

SCHEDULES

Schedule 1: Five-year Depreciation Schedule Applicable for the Purchase Option (based on the sum of years digits method)

Year	Depreciation Expense
1	$ 95,000
2	76,000
3	57,000
4	38,000
5	19,000
	$285,000

Note: The above schedule represents the depreciation which is deductible for tax purposes.

Schedule 2: Expected Annual Pre-Tax Operating Costs of the Equipment (cash outflows at the *end* of each year)

Year	Operating Costs if Purchased	Operating Costs if Leased**	Additional Costs of Purchase
1	$ 40,000	$ 20,000	$ 20,000
2	40,000	20,000	20,000
3	40,000	20,000	20,000
4	40,000	20,000	20,000
5	40,000	20,000	20,000
	$200,000	$100,000	$100,000

***These costs are in addition to the annual lease rate.*

Schedule 3: New Cash Revenues Expected to be Generated by the Equipment (cash inflows at the *end* of each year)

Year	Cash Revenue
1	$175,000
2	175,000
3	175,000
4	175,000
5	175,000
	$875,000

Schedule 4: Repayment schedule for a five-year *8%* bank term loan available to the firm in the principal amount of *$300,000* (installment payments due at the *end* of each year)

Year	Installment Payment	Interest	Principal Repayment	Remaining Balance
1	$ 75,137	$24,000	$ 51,137	$248,863
2	75,137	19,909	55,228	193,635
3	75,137	15,491	59,646	133,989
4	75,137	10,719	64,418	69,571
5	75,137	5,566	69,571	---
	$375,685	$75,685	$300,000	

**The numbers given for salvage value, operating costs, and cash revenues may be considered to be "expected values" or best estimates of the future values of these cash flows and are assumed to be as certain as the average investment cash flows of the firm.*

MICHIGAN STATE UNIVERSITY
GRADUATE SCHOOL OF BUSINESS ADMINISTRATION
LEASING SURVEY

ANALYST'S QUESTIONNAIRE

GENERAL INFORMATION

1. Your position in the company _____

2. Your department _____

3. Your department's level within the corporation:

   a. Corporate headquarters ☐
   b. Division ☐
   c. Subsidiary ☐
   d. Other (please specify) _____ ☐

4. Industry classification of your firm:

   a. Conglomerate ☐
   b. Agriculture, Forestry ☐
   c. Mining, Petroleum Refining ☐
   d. Manufacturing, Construction ☐
   e. Transportation, Communication ☐
   f. Other (please specify) _____ ☐

5. Fiscal year 1974 sales volume of your corporation:

   a. $2.5 billion and over ☐
   b. $1.5-$2.5 billion ☐
   c. $1.1-$1.5 billion ☐
   d. $800 million-$1.1 billion ☐
   e. Less than $800 million ☐

6. Does your firm lease capital assets?

Yes ☐
No ☐

If your answer to Number 6 is "No," please go to Question 12.

7. Dollar value of annual lease payments made in 1974 as shown in the corporation's annual report or on S.E.C. Form 10-K:

a. $100 million and over ☐
b. $50-$100 million ☐
c. $25-$50 million ☐
d. $10-$25 million ☐
e. Less than $10 million ☐

LEASE VERSUS PURCHASE ANALYSIS

8. Does your firm employ a formal financial analysis methodology for lease versus purchase decisions? (i.e., are the financial aspects of the lease-purchase decision analyzed using standard techniques such as net present value, internal rate of return, payback, etc.)

Yes ☐
No ☐ (please explain) _____

_____

_____

_____

If your answer to Number 8 is "No," please go to Question 12.

9. Do you consider the lease versus purchase decision to be:

a. A financing decision (i.e., a decision concerning alternative means of obtaining capital resources) . . . . . ☐

b. An investment decision (i.e., a decision concerning the allocation of resources to obtain the use of capital assets) . . . . . ☐

c. Both a financing and investment decision . . ☐

LEASE CASE PROBLEM

10. Based on your analysis of the lease case problem, and from a financial standpoint alone:

    a. The purchase is preferred ☐
    b. The lease is preferred ☐
    c. The solution is indeterminate ☐

    (Please explain) _____

    _____

    _____

Be sure to enclose a copy of your lease-purchase analysis worksheets with the questionnaire.

11. If possible, please specify the exact source(s) of the methodology you used to solve the case (e.g., company manual, textbook, academic article, etc.):

    Title: _____

    Journal or Magazine (if applicable) _____

    Author(s) _____

    Date of Publication _____

SPECIFIC IDENTIFICATION (OPTIONAL)

12. If you would like a copy of the results of this survey, please fill out the following:

    Name _____

    Company _____

    Address _____

    _____

NOTE: IF YOU WISH TO RETURN THIS FORM ANONYMOUSLY AND WOULD LIKE A COPY OF THE RESULTS, PLEASE SEND A POST CARD WITH YOUR NAME AND ADDRESS TO MR. PAUL ANDERSON AT THE ADDRESS SHOWN ON THE ENCLOSED BUSINESS REPLY ENVELOPE.

APPENDIX B

MICHIGAN STATE UNIVERSITY

GRADUATE SCHOOL OF BUSINESS ADMINISTRATION
DEPARTMENT OF MARKETING AND
TRANSPORTATION ADMINISTRATION

EAST LANSING • MICHIGAN • 48824

Dear Sir:

Recently we sent you a letter requesting your firm's participation in the Michigan State University Leasing Survey. To date, we have received responses from approximately 20 percent of the companies in our sample. While we are gratified by this response rate, we believe that a somewhat larger return would greatly improve the usefulness of the survey's results to the participants and to interested scholars. We would be very appreciative, therefore, if your staff could find the time to complete our case analysis and questionnaire.

The early returns which we have received are quite interesting, and if we are able to improve our response rate, we believe that you will find our summary of the survey results to be very useful.

In the event that your response is in the mail, or if you have returned the research instrument anonymously, we would like to thank you for your cooperation. Shortly, a letter will be sent to all of the participating firms who have requested a copy of our results. The letter will indicate the anticipated nature of the research report and its expected completion date.

Sincerely,

Paul F. Anderson
Graduate Assistant

BIBLIOGRAPHY

BIBLIOGRAPHY

Books

Alberts, William W., and Segall, Joel E., eds. The Corporate Merger. Chicago: University of Chicago Press, 1966.

Alderson, Wroe. Marketing Behavior and Executive Action. Homewood, IL: Richard D. Irwin, 1957.

APB Accounting Principles. New York: Commerce Clearing House, 1973.

Bennett, Peter D. Marketing Aspects of Capital-Equipment Leasing. Austin, TX: Bureau of Business Research, University of Texas, 1961.

Bierman, Harold, Jr., and Smidt, Seymour. The Capital Budgeting Decision. 2nd ed. New York: Macmillan Co., 1966.

Cohen, Albert H. Long Term Leases: Problems of Taxation, Finance and Accounting. Ann Arbor: University of Michigan Press, 1954.

Cooney, Gerald G. The Management and Operation of a Bank Affiliated Leasing Company. Boston: Financial Publishing Co., 1971.

Donaldson, Elvin F., and Pfahl, John K. Corporate Finance. 3rd ed. New York: Ronald Press, 1969.

Eiteman, Wilford John, and Davisson, Charles N. The Lease as a Financing and Selling Device. Ann Arbor: School of Business Administration, University of Michigan, 1951.

Engel, James F.; Wales, Hugh G.; and Warshaw, Martin R. Promotional Strategy. 3rd ed. Homewood, IL: Richard D. Irwin, 1975.

Engler, George N. Business Financial Management. Dallas, TX: Business Publications, 1975.

Fisk, George. Marketing Systems. New York: Harper and Row, 1967.

Francis, Jack Clark, and Archer, Stephen H. Portfolio Analysis. Englewood Cliffs, NJ: Prentice-Hall, 1971.

Hamel, Henry G. Leasing in Industry. New York: National Industrial Conference Board, 1968.

Hill, Richard M.; Alexander, Ralph S.; and Cross, James S. Industrial Marketing. 4th ed. Homewood, IL: Richard D. Irwin, 1975.

Jastrow, Morris, Jr. The Civilization of Babylonia and Assyria. Philadelphia: J. B. Lippincott Co., 1915.

Johnson, R. L. Financial Decision Making. Pacific Palisades, CA: Goodyear Publishing Co., 1973.

Johnson, Robert W. Financial Management. 3rd ed. Boston: Allyn and Bacon, 1966.

Kotler, Philip. Marketing Management. 2nd ed. Englewood Cliffs, NJ: Prentice-Hall, 1972.

Lazer, William. Marketing Management. New York: John Wiley and Sons, 1971.

Lev, Baruch. Financial Statement Analysis. Englewood Cliffs, NJ: Prentice-Hall, 1974.

Levitt, Theodore. Marketing for Business Growth. New York: McGraw-Hill, 1974.

Lorie, James H., and Hamilton, Mary T. The Stock Market. Homewood, IL: Richard D. Irwin, 1973.

Mao, James C. T. Quantitative Analysis of Financial Decisions. New York: Macmillan Co., 1969.

McCarthy, E. Jerome. Basic Marketing. 5th ed. Homewood, IL: Richard D. Irwin, 1975.

McGugan, Vincent John. Competition and Adjustment in the Equipment Leasing Industry. Boston: Federal Reserve Bank of Boston, 1972.

McMichael, Stanley L. Leases: Percentage, Short and Long Term. 4th ed. Englewood Cliffs, NJ: Prentice-Hall, 1947.

Nemmers, Erwin Esser, and Grunewald, Alan E. Basic Managerial Finance. 2nd ed. St. Paul, MN: West Publishing Co., 1975.

Porterfield, James T. S. Investment Decisions and Capital Costs. Englewood Cliffs, NJ: Prentice-Hall, 1965.

Quirin, G. David. The Capital Expenditure Decision. Homewood, IL: Richard D. Irwin, 1967.

Robichek, Alexander A., and Myers, Stewart C. Optimal Financing Decisions. Englewood Cliffs, NJ: Prentice-Hall, 1965.

Solomon, Ezra. The Theory of Financial Management. New York: Columbia University Press, 1963.

Sommerfeld, Ray M. Federal Taxes and Management Decisions. Homewood, IL: Richard D. Irwin, 1974.

Spiller, Earl A., Jr. Financial Accounting. Rev. ed. Homewood, IL: Richard D. Irwin, 1971.

Stanton, William J. Fundamentals of Marketing. 4th ed. New York: McGraw-Hill, 1975.

Staudt, Thomas A., and Taylor, Donald A. A Managerial Introduction to Marketing. 2nd ed. Englewood Cliffs, NJ: Prentice-Hall, 1970.

Van Horne, James C. Financial Management and Policy. Englewood Cliffs, NJ: Prentice-Hall, 1968.

_____. Financial Management and Policy. 3rd ed. Englewood Cliffs, NJ: Prentice-Hall, 1974.

Webster, Frederick E., and Wind, Yoram. Organizational Buying Behavior. Englewood Cliffs, NJ: Prentice-Hall, 1972.

Weston, J. Fred. Managerial Finance. New York: Holt, Rinehart and Winston, 1962.

_____, and Brigham, Eugene F. Managerial Finance. 2nd ed. New York: Holt, Rinehart and Winston, 1966.

_____, and _____. Managerial Finance. 3rd ed. New York: Holt, Rinehart and Winston, 1969.

_____, and _____. Managerial Finance. 4th ed. Hinsdale, IL: Dryden Press, 1972.

_____, and _____. Managerial Finance. 5th ed. Hinsdale, IL: Dryden Press, 1975.

Zaltman, Gerald; Pinson, Christian R. A.; and Angelmar, Reinhard. Metatheory and Consumer Research. New York: Holt, Rinehart and Winston, 1973.

Articles

Alsopp, Ernest S. "Industrial Financing by Purchase Lease." Appraisal Journal 16 (April 1, 1948): 154-64.

Babione, Francis A. "The Role of Rentals in Demand Stimulation." Michigan Business Review 16 (May 1964): 17-22.

Beechy, Thomas H. "Quasi-Debt Analysis of Financial Leases." Accounting Review 44 (April 1969): 375-81.

_____. "The Cost of Leasing: Comment and Correction." Accounting Review 45 (October 1970): 769-73.

Berry, Leonard L., and Maricle, Kenneth E. "Consumption Without Ownership: Marketing Opportunity for Today and Tomorrow." MSU Business Topics 21 (Spring 1973): 33-41.

Bierman, Harold, Jr. "Analysis of the Lease-or-Buy Decision: Comment." Journal of Finance 28 (September 1973): 1019-21.

Bower, Richard S. "Issues in Lease Financing." Financial Management 2 (Winter 1973): 25-34.

_____; Herringer, Frank C.; and Williamson, J. Peter. "Lease Evaluation." Accounting Review 41 (April 1966): 257-65.

_____, and Lessard, Donald R. "An Operational Approach to Risk-Screening." Journal of Finance 28 (May 1973): 321-37.

Brigham, Eugene F. "Equipment Lease Financing: A Bank Management Imperative." The Banker's Magazine 149 (Winter 1966): 65-75.

_____. "The Impact of Bank Entry on Market Conditions in the Equipment Leasing Industry." National Banking Review 2 (September 1964): 11-26.

Carlson, C. Robert, and Wort, Donald H. "A New Look at the Lease-vs.-Purchase Decision." Journal of Economics and Business 26 (Spring 1974): 199-202.

Clark, Robert A.; Jantorni, Joan M.; and Gann, Robert R. "Analysis of the Lease-or-Buy Decision: Comment." Journal of Finance 28 (September 1973): 1015-16.

Cooper, Kerry, and Strawser, Robert H. "Evaluation of Capital Investment Projects Involving Asset Leases." Financial Management 4 (Spring 1975): 44-49.

Doenges, R. Conrad. "The Cost of Leasing." Engineering Economist 17 (Fall 1971): 31-44.

Ferrara, William L. "Should Investment and Financing Decisions Be Separated?" Accounting Review 41 (January 1966): 106-14.

_____. "Lease-Purchase Decisions: The Quasi-Financing Approach--Revised and Extended." Management Accounting 55 (January 1974): 21-26.

_____, and Wojdak, Joseph F. "Valuation of Long-Term Leases." Financial Analysts Journal 25 (November-December 1969): 29-32.

Fruhan, William E. "Pyrrhic Victories in Fights for Market Share." Harvard Business Review 50 (September-October 1972): 100-107.

Gant, Donald R. "Illusion in Lease Financing." Harvard Business Review 37 (March-April 1959); reprinted in Leasing Series. Boston: Harvard Business Review, n.d., pp. 1-22.

Gordon, Myron J. "A General Solution to the Buy or Lease Decision: A Pedagogical Note." Journal of Finance 29 (March 1974): 245-50.

Griesinger, Frank K. "Pros and Cons of Leasing Equipment." Harvard Business Review 33 (March-April 1955); reprinted in Leasing Series. Boston: Harvard Business Review, n.d., pp. 49-63.

Jensen, Michael C. "Capital Markets: Theory and Evidence." Bell Journal of Economics and Management Science 2 (Autumn 1972): 357-98.

Johnson, Robert W., and Lewellen, Wilbur G. "Analysis of the Lease-or-Buy Decision." Journal of Finance 27 (September 1972): 815-23.

_____, and _____. "Reply." Journal of Finance 28 (September 1973): 1024-28.

"Leases: A Hidden Debt." Business Week (October 12, 1974): 60-62.

Leatham, John T. "No Letup in Leasing." Conference Board Record 11 (March 1974): 61-64.

Lev, Baruch, and Orgler, Yair E. "Analysis of the Lease-or-Buy Decision: Comment." Journal of Finance 28 (September 1973): 1022-23.

Levy, Mark. "The Trend of Corporations to Sell Their Real Estate to Institutional Investors." The Mortgage Banker 8 (November 1947): 11-16 and (December 1947): 2-7.

Lintner, John. "Security Prices, Risk and Maximal Gains from Diversification." Journal of Finance 20 (December 1965): 587-615.

Lusztig, Peter. "Analysis of the Lease-or-Buy Decision: Comment." Journal of Finance 28 (September 1973): 1017-18.

Mauser, Ferdinand F. "A Universe-in-Motion Approach to Marketing." Managerial Marketing: Perspectives and Viewpoints, 3rd ed. Edited by Eugene J. Kelley and William Lazer. Homewood, IL: Richard D. Irwin, 1967, pp. 46-56.

McEachron, William D. "Leasing: A Discounted Cash-Flow Approach." The Controller 29 (May 1961): 213-19.

McNeill, Russell B. "The Lease as a Marketing Tool." Harvard Business Review 22 (Summer 1944): 415-30.

Mitchell, G. B. "After-Tax Cost of Leasing." Accounting Review 45 (April 1970): 308-14.

Modigliani, Franco, and Miller, Merton H. "Corporate Income Taxes and the Cost of Capital: A Correction." American Economic Review 53 (June 1963): 433-43.

Mossin, Jan. "Equilibrium in a Capital Asset Market." Econometrica 34 (October 1966): 768-83.

_____. "Security Pricing and Investment Criteria in Competitive Markets." American Economic Review 59 (December 1969): 749-56.

Myers, Stewart C. "Procedures for Capital Budgeting Under Uncertainty." Industrial Management Review 9 (Spring 1968): 1-19.

Nantell, Timothy J. "Equivalence of Lease vs. Buy Analyses." Financial Management 2 (Autumn 1973): 61-65.

Perkins, R. A. "Leasing as a Marketing Tool." Leasing of Industrial Equipment. Washington: Machinery and Allied Products Institute, 1965, pp. 40-51.

Rochwarger, Leonard. "The Flexible World of Leasing." Fortune 89 (November 1974): 50-77.

Roenfeldt, Rodney L., and Osteryoung, Jerome S. "Analysis of Financial Leases." Financial Management 2 (Spring 1973): 74-87.

Rubinstein, Mark E. "A Mean-Variance Synthesis of Corporate Financial Theory." Journal of Finance 28 (March 1973): 167-81.

Schall, Lawrence D. "Asset Valuation, Firm Investment and Firm Diversification." Journal of Business 45 (January 1972): 11-28.

_____. "The Lease-or-Buy and Asset Acquisition Decisions." Journal of Finance 29 (September 1974): 1203-14.

Sharpe, William F. "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk." Journal of Finance 19 (September 1964): 425-42.

Sheth, Jagdish N. "A Model of Industrial Buyer Behavior." Journal of Marketing 37 (October 1973): 50-56.

Vancil, Richard F. "Lease or Borrow: New Method of Analysis." Harvard Business Review 39 (September-October 1961); reprinted in Leasing Series. Boston: Harvard Business Review, n.d., pp. 79-93.

_____. "Lease or Borrow: Steps in Negotiation." Harvard Business Review 39 (November-December 1961); reprinted in Leasing Series. Boston: Harvard Business Review, n.d., pp. 94-109.

Vancil, Richard F., and Anthony, Robert N. "The Financial Community Looks at Leasing." Harvard Business Review 37 (November-December 1959); reprinted in Leasing Series. Boston: Harvard Business Review, n.d., pp. 31-48.

Vanderwicken, Peter. "The Powerful Logic of the Leasing Boom." Fortune 88 (November 1973): 132-36.

Weston, J. Fred, and Craig, Rupert. "Understanding Lease Financing." California Management Review 2 (Winter 1960): 67-75.

Wilson, John J., Jr. "Industrial Financing Through Own-Lease; 'What-Why-How' of the Method." The Controller 17 (February 1949): 60, 76, 78, 80, 82.

Wyman, Harold E. "Financial Lease Evaluation Under Conditions of Uncertainty." Accounting Review 48 (July 1973): 489-93.

Legal References

Black's Law Dictionary. Revised 4th ed. 1968.

P-H Federal Tax Course 1975.

P-H Federal Tax Course 1976.

Rev. Proc. 75-21, IBR 1975-18.

Rev. Rul. 55-540, 1955 CB 41.

2 P-H 1975 Federal Taxes.

U.S. Department of the Treasury. Annual Report of the Comptroller of the Currency, 1963.

Miscellaneous

AAEL News Bulletin. 16 June 1975.

AAEL News Bulletin. 18 July 1975.

"Accounting for Leases." Executive News Briefs 3 (September 1975): 1-2.

Babione, Francis A. "Marketing Equipment by Leasing." Ph.D. dissertation, Ohio State University, 1949.

Bytwork, Alvin J. "The Effectiveness of Alternatives to Purchase in the Marketing of Construction Equipment through Distributors." Ph.D. dissertation, Michigan State University, 1961.

Cohen, Albert H. "Long-Term Net Leasing Practice: Problems of Taxation, Finance and Accounting." Ph.D. dissertation, University of Michigan, 1953.

Eiteman, Wilford J. Telephone interview. 28 July 1975.

Findlay, M. Chapman, III. "Financial Lease Evaluation: Survey and Synthesis." Paper presented at the Eastern Finance Association meetings, Storrs, CN, 12 April 1973.

Kares, Peter. "Some Economic Implications of Equipment Lease Financing." Ph.D. dissertation, Purdue University, 1968.

MacNab, Bruce E. "The Lease as a Device to Market Equipment." M.B.A. thesis, Ohio State University, 1959.

Nantell, Timothy J. "Lessor's Pricing Decision, An Indifference Theorem, and the Evaluation of Lease vs. Buy Algorithms." Ann Arbor, 1975. (Typewritten.)

Nelson, Andrew T. "The Impact of Leases on Financial Analysis." Ph.D. dissertation, Michigan State University, 1962.

Treynor, Jack L. "Toward a Theory of Market Value of Risky Assets." 1961. (Typewritten.)

Wehle, Mary M. "Lessee Decision Criteria and Accounting Implications." Ph.D. dissertation, Harvard University, 1972.