

Personal Financial Planning and Common Sense Estate Review

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Editor's Note: The 3 papers included here are part of a seminar presented by the author.

1981 Economic Recovery Act

I. INDIVIDUAL TAX CHANGES:

- A. Tax Bracket Rate Reductions
- B. Capital Gains Rate Reductions
 - 1. Sales After June 9, 1981
 - 2. All Gains Recognized in Calendar Year 1982 et seq.
- C. Alternative Minimum Tax Rate Reduction
- D. Inflation Tax Bracketing for Years Ending After 1984
- E. Marriage Penalty Mitigation
- F. Charitable Contributions Deduction for Non-Itemizers
- G. Child & Dependent Care Credit
- H. Adoption Expense Deduction
- I. Sale of Principal Residence
 - 1. Two Year Replacement Period
 - 2. \$125,000 Exclusion on Certain Gains

II. BUSINESS CHANGES:

- A. Accelerated Cost Recovery System (ACRS) Permits a Faster, Easier, More Advantageous Convention for Depreciation Expense.
- B. Disallowance for New Component Depreciation
- C. Sales or Exchanges of ACRS Property
- D. Phased in Expensing of Certain ACRS Property
- E. ACRS Depreciation on Leased Personal Property is Now a Tax Preference Item.
- F. Leasehold Improvements Have Their Own ACRS Tables
- G. Investment Tax Credits Have Been Liberalized
- H. Rehabilitation Credits Have Been Increased—New Tax Savings Opportunities
- I. Contributions for Research Property
- J. Research & Experimentation Credit
- K. Increased Charitable Contributions for Corporations
- L. Increased Gifts and Awards Deductions
 - 1. Performance

- 2. Longevity
- 3. Safety

M. 15-Year Net Operating Loss and Carryover Provisions

N. For Other Than Personal Service Corporations, the Accumulated Earnings Safe Haven has Increased to \$250,000

O. Two Lower \$25,000 Tax Brackets for Corporations Will be Lowered

P. Increase in the Number of Shareholders in Sub Chapter S Corporations to 25 Members—Also Changes in Trusts as Shareholders

III. SAVINGS INCENTIVE PROVISIONS:

- A. Increase in Individual Retirement Account (IRA) Limitations
- B. KEOGH Plan Limitation Increase
- C. Tax Exempt Savings Certificates
- D. Net Interest Exclusion After 1981

IV. ESTATE TAX:

- A. Six Year Phased in Gift/Estate Tax Credit Increase
 - B. Rate Reduction From 70% to 50% by 1985
 - C. Unlimited Marital Deduction
 - D. Terminable Trust May be Includible in Marital Deduction if Elected
 - E. Gift Tax Return Changes
 - 1. Must be Filed only Annually (Usually by April 15) After 1981
 - 2. Interspousal Transfers are Exempt from Gift Tax Reporting Rules and Return Filings
 - F. Jointly Held Property Will be Included One-Half in the First Spouse to Die
 - G. Special Use Real Property Used in a Small Trade or Business Will Be Discounted in the Estate
 - H. Installment Payment of Estate Taxes are Clarified
 - I. Increase in Annual Gift Tax Exclusion to \$10,000 — Clifford Trusts May Now be Back in Vogue
- #### V. MISCELLANEOUS CHANGES:
- A. After August 13, 1981, Delinquent Taxes Will be Assessed an Interest Rate of 100% of Annual Prime
 - B. Increase in Civil and Criminal Penalties for Filing False W-4's

**IMPLIED EQUIVALENT MARKET YIELDS FOR SINGLE AND JOINT TAXABLE
INCOME CATEGORIES FOR INCOME EARNED IN 1981¹
BY VARIOUS ALL SAVER'S CERTIFICATE YIELDS**

Single Taxable Income	Joint Taxable Income	Marginal Rate	All Saver's Certificate Yields				
			9.00%	10.00%	11.00%	12.00%	13.00%
0- \$ 2,300	0- \$ 3,400	0%	9.00	10.00	11.00	12.00	13.00
2,300- 3,400	3,400- 4,500	14	10.47	11.63	12.79	13.95	15.12
3,400- 4,400	5,500- 7,600	16	10.71	11.90	13.10	14.29	15.48
4,400- 6,500	7,600- 11,900	18	10.98	12.20	13.41	14.63	15.86
6,500- 8,500		19	11.11	12.35	13.58	14.81	16.06
8,500- 10,800	11,900- 16,000	21	11.39	12.66	13.92	15.19	16.46
10,800- 12,900	16,000- 20,200	24	11.84	13.16	14.47	15.79	17.11
12,900- 15,000		26	12.16	13.51	14.86	16.22	17.57
	20,200- 24,600	28	12.50	13.89	15.28	16.67	18.06
15,000- 18,200		30	12.86	14.29	15.71	17.14	18.57
	24,600- 29,900	32	13.24	14.71	16.18	17.65	19.12
18,200- 23,500		34	13.64	15.15	16.67	18.18	19.70
	29,900- 35,200	37	14.29	15.87	17.46	19.05	20.63
23,500- 28,800		39	14.75	16.39	18.03	19.67	21.31
	35,200- 45,800	43	15.79	17.54	19.30	21.05	22.81
28,800- 34,100		44	16.07	17.86	19.64	21.43	23.21
34,100- 41,500	45,800- 60,000	49	17.65	19.61	21.57	23.53	25.49
	60,000- 85,600	54	19.57	21.74	23.91	26.09	28.26
41,500- 55,300		55	20.00	22.22	24.44	26.67	28.89
	85,600- 109,400	59	21.95	24.39	26.83	29.27	31.71
55,300- 81,800		63	24.32	27.03	29.73	32.43	35.14
	109,400- 162,400	64	25.00	27.78	30.56	33.33	36.11
81,800- 108,300	162,400- 215,400	68	28.13	31.25	34.38	37.50	40.62
108,300+	215,400+	70	30.00	33.33	36.67	40.00	43.33

¹Taxable Income Categories Based on 1980 Tax Tables.

NOTE: These taxable income tables should also provide approximate marginal tax rates for income earned in 1981, since the 5% reduction in marginal tax rates only applies to income earned in the 4th quarter of 1981 and is to be handled via a tax credit applied to the amount of tax owed.

- C. Penalty for Overvaluing Assets to Obtain a Tax Deduction
- D. Negligence Underpayment of Tax Penalty Equal to 50% of the Interest Due on the Underpayment
- E. Failure to File 1099's — Payor Will be Penalized \$10 per Statement
- F. Overstated Deposit Claims for Taxes will Yield a Penalty of 25% of the Overstatement
- G. Commodity Straddles Advantage Have Been Changed — "Market to Market"
- H. Until December 31, 1983, No Fringe Benefit Regulations May Be Issued if the Effective Date is Before January 1, 1984.
- I. Group Legal Plans Have Been Extended Until December 31, 1984.

- J. Related Party Real Estate Installment Sales Yield an Imputed Rate of 7% instead of the 10% for Transactions in Aggregate up to \$550,000

OTHER RECENT FEDERAL TAX CHANGES

- A. INSTALLMENT SALES REVISION ACT OF 1980 (October 19, 1980) (RE: Section 453, IRC 1954)
 - 1. Generally, Installment Sales Gains are Deferred Until Proceeds are Received
 - a. Automatic — No Election
 - b. 30% Initial Payment Limit Rule Eliminated
 - c. Requirement that a Deferred Payment Sale Have Two or More Payments is Eliminated
 - d. Casual Sale of Personal Property Exceeding \$1,000 Requirement Has Been Eliminated.



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**MAXIMUM DEPOSITS EARNING \$1000/\$2000 INTEREST INCOME
FOR VARIOUS TAX-EXEMPT CERTIFICATE RATES¹**

Interest Rate	SIMPLE INTEREST		CONTINUOUS COMPOUNDING	
	Single Return (\$1000 Income)	Joint Return (\$2000 Income)	Single Return (\$1000 Income)	Joint Return (\$2000 Income)
9.00	\$11,111	\$22,222	\$10,466	\$20,932
9.25	10,811	21,622	10,171	20,342
9.50	10,526	21,053	9,890	19,780
9.75	10,256	20,513	9,623	19,246
10.00	10,000	20,000	9,371	18,742
10.25	9,756	19,512	9,131	18,262
10.50	9,524	19,048	8,902	17,804
10.75	9,302	18,605	8,684	17,368
11.00	9,091	18,182	8,476	16,952
11.25	8,889	17,778	8,277	16,554
11.50	8,696	17,391	8,086	16,172
11.75	8,511	17,021	7,904	15,808
12.00	8,333	16,667	7,729	15,458
12.25	8,163	16,327	7,562	15,124
12.50	8,000	16,000	7,401	14,802
12.75	7,843	15,686	7,246	14,492
13.00	7,692	15,385	7,098	14,196

¹These deposit amounts specify the maximum deposit for which the entirety of interest income will be tax-exempt.

- 2. Contingent Sales Price Transactions are Now Possible
- 3. Related Party Transactions Have Changed
 - a. Redefines Related Party
 - b. Two Year Disposal by Related Party Triggers Entire Gain on First Transaction
- 4. Section 337 Liquidation Now "Practically" Possible With Installment Obligations
- B. POPULARITY OF DIVISIVE REORGANIZATION (No Fault Corporate Divorce) (Section 355 and 368)
- C. COMMON PAYMASTER ELECTION
- D. POPULARITY OF CHANGE IN ANNUAL ACCOUNTING PERIOD
- E. REQUIEM FOR A FAMILY TRUST PLAN
- F. ATTACK OF AN INDEPENDENT CONTRACTOR
- G. CAPITALIZATION OF DRUG AND PROFESSIONAL SUPPLY INVENTORY
- H. CORPORATE LOANS TO SHAREHOLDERS INTEREST FREE
- I. SICK PAY EXEMPTION
- J. REPETITIVE AUDIT RELIEF
- K. PARTNER DEATH MAY MURDER THE SURVIVING PARTNERS WITH TAX
- L. ADVANTAGES OF INCORPORATION REVISITED *AGAIN*
- M. FOREIGN CONVENTIONS
- N. TAX SHELTER AUDIT HEADACHES

- O. ADVANTAGES OF LUMP SUM DISTRIBUTION COMPUTATION — N/A FOR IRA
- P. INVESTMENT CREDIT ON PARTNERSHIP PROPERTY ALREADY OWNED
- Q. DEBT VS. EQUITY — SHAREHOLDER LOANS
- R. QUESTIONS RE: RETIRED LIFE RESERVE CORPORATE INSURANCE AS FRINGE
- S. ADVERTISING VS. CHARITABLE CONTRIBUTION
- T. SELF-INSURED MEDICAL REIMBURSEMENT PLANS — FINAL REGS.

Valuation of a Veterinary Practice

I. INTRODUCTION

- A. Importance of the valuation
 - 1. Could be the culmination of forty or more years of your time and effort; give it sufficient time and your personal attention
- B. *Uses of the valuation*
 - 1. Purchase/sale of a business
 - 2. Buy-in/buy-out of a business
 - 3. Merger of businesses
 - 4. Buy-sell agreement between corporate business and shareholders
 - 5. Equity financing
 - 6. Determination of Federal and State death taxes

7. General estate planning including gifting
8. Divorce settlements
9. Employee stock bonuses and qualified stock ownership plans
10. Removing doubts in a transaction lacking arm's-length attributes
11. Charitable contributions

C. *Caveat on valuation*

1. There are valuation methods, approaches, and rules of thumb, but ultimate valuation depends on the circumstances, objectives, and parties involved

D. *Three major areas of consideration in a valuation*

- *1. Determination of a value
2. Financial arrangements related to the purchase, sale, etc.
3. Tax considerations

E. *Assets of a business (pyramid concept - page 3)*

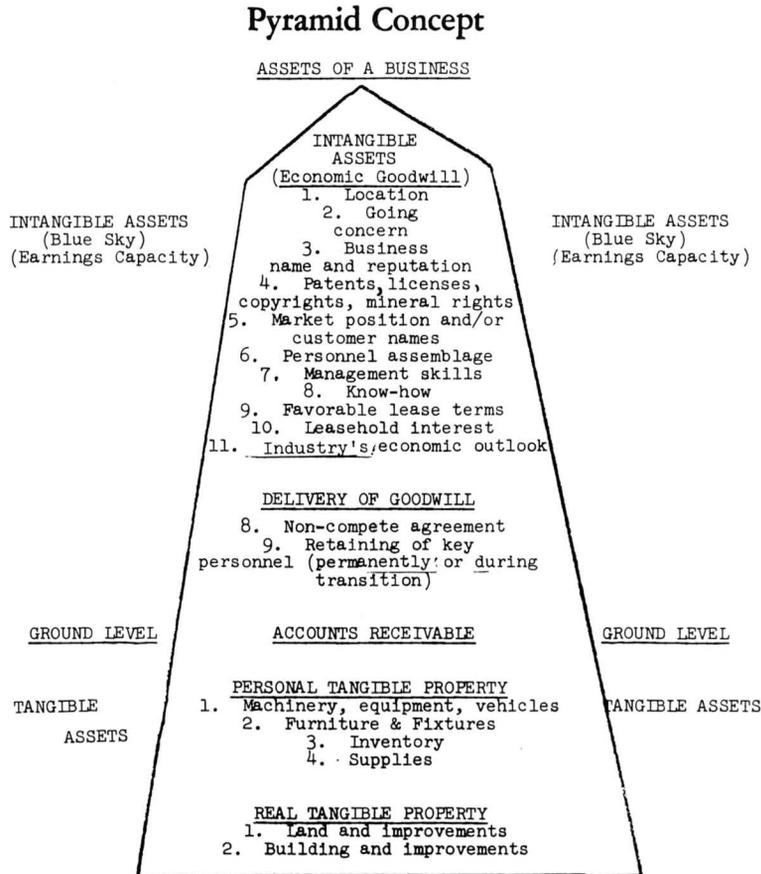
F. *Valuation methods and applications*

1. Income method - capitalization of expected earnings from the business at a reasonable return on investment based on relative risk and current interest rates
2. Market method - comparison with results of similar property sold (that is the comparison with results of other businesses purchased/sold, merged, bought into, bought out, and valued for estate purposes expressed in terms of a price/earnings ratio)

3. Cost method - determination of replacement cost, less depreciation of obsolescence, if any, of all tangible assets
4. Valuation method or methods used is determined by assets being valued
 - 1) Valuing a residence not for rental purposes (tangible assets)
 - market method (tangible)
 - cost method (tangible)
 - 2) Valuing an apartment building (tangible and intangible assets)
 - income method (tangible and/or intangible)
 - market method (tangible or intangible)
 - cost method (tangible only)
 - 3) Valuing a business (tangible and intangible assets)
 - same as for valuing an apartment building
5. Income method - example #1

Jim Purchaser wants to purchase an automatic car wash business for investment; the land, building, and equipment will be leased. How much should Jim Purchaser pay for the business?

Bob Seller has been the absentee - owner of the car wash business since inception two years ago and generates income after all expenses but before any draw's by Bob of \$20,000. How much should Bob Seller sell the business for?



Income method - capitalization of expected earnings at a reasonable return on investment based on relative risk and current interest rates (paid to creditors or investors)

Reasonable return on investment based on risk on investment and current interest rates received on such investment

Low risk (investment by an investor or creditor in certificate of deposits, treasury bills, mortgage loans, secured loans, equipment leases, stock of a company with its shares listed on a national exchange)

8 to 12% or avg. 10% $100/10 = 10$
capitalization rate

Medium risk (investment by a creditor or investor in unsecured loans, department store charge accounts, bank credit cards, investment guaranteed by a signature, stock of a company with its shares sold over the counter)

13 to 18% or avg. 15.5%
 $100/15.5 = 6.5$
capitalization rate

Medium/heavy risk (investment by an investor in a business with its ownership closely-held and with the investor reasonably assured of return customers because of better than average reputation, stable or improving location, and delivery of goodwill)

19 to 21% or avg. 20%
 $100/20 = 5$
capitalization rate

Heavy risk (investment by an investor in a business with its ownership closely-held and with the investor not reasonably assured of return customers because of only average reputation, or declining location, or no delivery of goodwill)

22 to 28% or avg. 25%
 $100/25 = 4$
capitalization rate

Expected earnings (based on prior years)	\$20,000
Capitalization rate used for an investment in a car wash business	<u>4</u>
Value of the car wash business	<u>\$80,000</u>

6. Applications of the cost method (advantages and disadvantages)
 - 1) Seller's actual cost
 - 2) Net book value (seller's tax basis)
 - 3) Dealer trade-in value
 - 4) Professional appraisal
 - 5) Operating ratios
 - 6) Actual cash value

- 7) Catalog cost
- 8) Construction cost (per square foot-buildings)

APPLICATIONS - Valuation of Tangible Property

- I. Seller's Actual Cost
 - A. Advantages
 - 1) Could be easily obtainable from accountant's property records if individual assets are itemized.
 - 2) Simple to substantiate from tax return or financial statement.
 - B. Disadvantages
 - 1) Inflation factors aren't considered.
 - 2) Obsolescence isn't considered.
 - 3) The decreased market demand for an asset which could reduce its value is not considered.
 - 4) Wear and tear of the asset due to use is not taken into account.
- II. Net Book Value (Seller's tax basis) - the amount paid by the owner/seller for the tangible property less depreciation taken by him for tax purposes.
 - A. Advantages
 - 1) Same as advantages at seller's actual cost.
 - B. Disadvantages
 - I to 3) Same disadvantages as seller's actual cost II B. 1 to 3)
 - 4) Aggressive tax treatment of assets does not correspond to economic value.
 - a. Different depreciation methods - straight line, sum of the years digits, 150% declining balance, and 200% declining balance.
 - b. Shorter estimate of useful life or perhaps too long a life to take advantage of investment credit provision.
- III. Dealer Trade-in Value - The dollar Allowance permitted by a dealer for old equipment which will be exchanged as partial payment for new equipment.
 - A. Advantages
 - 1) At least some value is assigned to the asset which might reflect market conditions.
 - B. Disadvantages
 - 1) The Value is Relative
 - a. Purchase price of new equipment affects the value of the old equipment trade-in.
 - b. Different makers of equipment will not give similar value
i.e.) G.M. dealer will offer less for a used Ford than a Ford dealer.
 - 2) The value allowed is not an accurate measure of worth. Value is usually less than a fair value of the equipment. Dealer wants to make a profit.
 - 3) Practical consideration - Quotations of value may be difficult to obtain unless you are willing to purchase new equipment.
- IV. Professional Appraisal - is performed by an individual with substantial valuation experience and certified as

to competence who is engaged to determine a fair value of specified property.

A. Advantages

- 1) His view is objective.
- 2) Obtensibly to unexperienced buyers, his valuation might carry more weight and be more credible.
- 3) Credentials and experience of the appraiser can be definitively determined.

B. Disadvantages

- 1) Costly.
- 2) More than one appraiser's opinion might be desired.
- 3) Appraiser may not be familiar with:
 - a. Your specific business assets as a group.
 - b. The utilization of your assets to your particular business.
- 4) The assumptions of the appraiser have to be considered.

V. Operating Ratios - an application which bases valuation of an asset class equipment upon a standardized percentage of your industry's gross or net income.

For Example - veterinarian:

Avg. Inventory of drugs, supplies, etc. at three prior year-ends	<u>\$ 5,000</u>	Approx.
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Avg. gross receipts for three prior years	<u>\$100,000</u>
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Operating ratio (\$5,000/ \$100,000)	<u>5%</u>
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Gross Receipts for current year	<u>\$110,000</u>
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Inventory	<u>\$ 5,500</u>
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A. Advantages

- 1) Extremely easy to value.
- 2) Little time is required.

B. Disadvantages

- 1) Sets a value with no regard to property on hand as of the valuation date.
- 2) No regard to obsolescence or inflationary factors.

VI. Actual Cash Value - *Current replacement cost less depreciation. Calculated at current replacement cost x (remaining useful life of asset ÷ total useful life in years). Generally actual cash value is the amount an insurance company will reimburse for total loss of equipment by fire or theft.

A. Advantages

- 1) Takes inflation and obsolescence into account.
- 2) With proper inquiry is readily determined (inventory and equipment vendors and dealers)

- 3) Easily substantiated by worksheets and is extremely credible.
- 4) Extremely accurate.
- 5) Minimal cost - no appraiser fee.
- 6) Simple calculation based on S/L application.
- 7) Very easy to standardize within your industry.
- 8) Originating manufacturer or supplier offers value of machinery and inventory he is most familiar. (No G.M. - Ford Syndrome)
- 9) Manufacturers are willing to quote prices of new equipment because they value you as a potential customer.

B. Disadvantages

- 1) Requires your staff and you to expend time.

VII. Catalog Cost - Current replacement cost obtained from a supply house.

A. Advantages

- 1) Easy to obtain and extremely accurate
- 2) Very credible
- 3) Considers inflationary factors

B. Disadvantages

- 1) Requires your staff and you to expend some time to determine the valuation.

G. Applying valuation methods to the various approaches used in the valuation of assets of a small business (different approaches are used depending upon the objective of the valuation)

A. Valuation objective and approach

- 1) Objective - raising private and institutional capital or withdrawing cash rather than building value - service organization or professional practice - valuation method primarily used is the "income method" only (valuing earnings capacity)
- 2) Objective - going public
 - Valuation method primarily used is a combination of the "income and market methods" (price/earnings ratio of similar businesses - valuing earnings capacity)
- 3) Objective - valuing a small business for estate tax purposes, or in the case of a corporation, value assigned to contributions to an employee stock ownership trust
 - valuation method primarily used is a combination of the "income and cost methods" (valuing earnings capacity and underlying tangible assets)
 - A formula determined by the Internal Revenue Service is the following:

$$V = T + C5 (Avg. - 10\% T)$$

V = Total valuation

T = Value of tangible property

C5 = Capitalization rate of 5

Avg = Average Earnings

ILLUSTRATION: A corporation has average tangible assets of \$200,000 and average

*Current replacement cost - the amount paid today by a buyer of same or like tangible property.

earnings of \$50,000 a year. Assuming a fair return of 10% and a capitalization rate of 20%, the goodwill would be \$150,000 under the Treasury formula determined as follows:

(1) Average earnings	\$ 50,000
(2) Average tangible assets	200,000
(3) Fair percentage return (10%) on tangible assets	20,000
(4) Average earnings attributable to goodwill (1)-(3)	30,000
(5) Capitalize average earnings attributable to goodwill at 20% (multiply by 5) to get the value of goodwill	150,000

If the net worth as of the valuation date is also \$200,000, then the total value of the corporation would be \$350,000 (\$200,000 + \$150,000)

4. Objective - valuing a small (closely-held) business for purchase/sale in its entirety or a portion

—valuation method primarily used is a combination of the income and cost methods (valuing earnings capacity and underlying tangible assets)

—A fair value should be determined to allow a fair return on the money and time invested by the purchaser (a return on investment philosophy)

—A formula could be:

$$V = T + C (Ex - (10\%T + RT))$$

V = Total valuation

T = Value of tangible property

C = Capitalization rate

Ex = Expected earnings, defined as estimated future annual earnings of a business based on prior three year financial statements or tax returns filed, before interest on debt, and the owner's(s') salary (draw) and all fringe benefits

RT = Return on time, defined as the maximum salary and fringe benefits that could be paid an employee(s) performing the job of the owner(s) *but not having the risks of ownership.*

**DETERMINATION OF FAIR RETURN
(SALARY & FRINGES) ON TIME INVESTED
(as employee without risks of ownership)**

If purchaser will be an:

1. Absentee owner
 - a. Then no return on time invested to be determined
2. Employee (or working partner/sole-proprietor) owner:
 - a. The return of time invested could be maximum salary and fringes that would have to be paid a hired-employee to perform the purchaser's job duties and responsibilities, with the hired-employee not having risks and responsibilities of ownership (industry statistics)

b. And is employed at company being purchased prior to such purchase, the purchaser's present salary and fringes adjusted upward for new job duties and responsibilities but excluding risks and responsibilities of ownership

c. The salary and fringes from employment obtainable elsewhere by the purchaser with job duties and responsibilities similar to those job duties and responsibilities (excluding risks and responsibilities of ownership) to be performed at the company being purchased

ILLUSTRATION

Mr. Purchaser has now been an employee-sales manager of Ace Co. for over ten years and is contemplating the purchase of the retiring president's 100% interest in Ace Co. which includes the building and land. Mr. Purchaser is receiving \$22,500 annually in salary and fringes from his present employment and could hire another sales manager for the same salary and fringes. Mr. Purchaser also has a credit line of \$100,000 available at a bank at 9% interest.

Mr. Seller is the retiring president and is selling his 100% interest for \$100,000 (land, building, equipment, supplies, or tangible assets for \$70,000, goodwill or intangible assets for \$30,000). Mr. Seller has grossed over the past three years an average of \$70,000 and netted before interest and Mr. Seller's draws approximately \$31,500.

Will Mr. Purchaser by overpaying today (not considering future potential) for the goodwill at \$30,000 from a dollar and cent or a return on investment philosophy?

GOODWILL COMPUTATION

Assumptions:

Gross receipts from business	<u>\$70,000</u>
Expected earnings from business	<u>\$31,500</u>
Value of tangible assets	<u>\$70,000</u>
Value of goodwill determined by Mr. Seller	<u>\$30,000</u>
Fair Return on time	<u>\$22,500</u>
Income method or capitalization of expected earnings	
Expected earnings	\$31,500
Fair return on money invested in tangible assets 10% x \$70,000	(7,000)
Remainder	24,500
Fair return on time invested	<u>(22,500)</u>

Remaining earnings returned to Mr. Purchaser each year on his investment of \$30,000 in goodwill or 2,000/30,000 =

a 6.7% return	<u>\$2,000</u>
What should be paid for goodwill?	
\$2,000 x 5 (20% return) =	<u>\$10,000</u>
Difference between goodwill computed under income method and per Mr. Seller	<u>\$20,000</u>

H. Other considerations

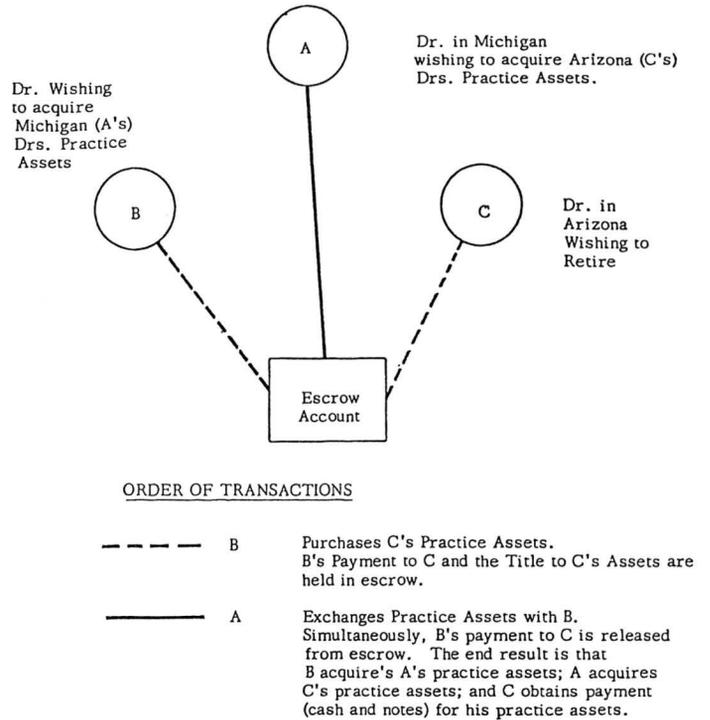
- 1) A discount from the total valuation could be made due to the absence of a public market for the stock and/or lack of control inherent in a minority interest in a closely-held corporation (IRS has allowed a 20% discount) — could be considered in capitalization rate.
- 2) For a company with a history of earnings, expected earnings could be projected for increases in the future and then capitalized.
- 3) Expected earnings (with projected increases or not) should be discounted or present valued where the life of the purchased operation is limited by contract or by economics (competition).

Economic Order Quality Methodology in Inventory Order and Control.

OLD FORMULA WITH NEW ADAPTATION

One of the greatest questions raised by many practitioners in ordering drug inventory is how to order the inventory required. Most practitioners realize that the greatest control is through purchases and not through constant maintenance and counting of items on hand. If purchases can be controlled to the level where stock-outs of key drugs never occur, a good return on investment is realized from holding an adequate number of drug and professional supplies, and a happy medium is reached to maximize profit and minimize cost. Very intricate control systems have been devised including utilization of micro and mini processors to keep track of individual levels of drug and professional supply inventory in any one given time. Other practices have evolved into monthly physical inventory counts to determine proper carrying levels. However, like any piece of data which must be accumulated, retained and summarized, an inventory control system is expensive. For a small animal practice, the return on investment in time spent both from employees and also practitioners in reviewing and maintaining the inventory level, does not justify the opportunity cost saved through greater cash utilization of dollars which would normally be devoted to drug and professional supply inventory. Instead of the massive rituals described through

Basic Concept of a Like—Kind Exchange



computer-generated inventory control tallies and also tedious physical counts, utilization of economic order quantity formulas can be used to help mitigate some of the problems involved.

The economic order quantity formula is not an impossible methodology for ordering drug and professional supply inventory. In fact, the classic basic formula can be used with any \$12.00 calculator which has a square root key. The basis of the economic order quantity is that the formula recognizes three specific costs incurred in ordering and holding drug and professional supply inventory. These costs are: the cost per unit to purchase; the ordering cost incurred per order (the time involved in determining need to restock, place the order, internal control in reviewing shipping invoices to actual quantity shipped and subsequently, to invoice sent by drug supplier, shelving and unpacking); and finally, the holding cost. The cost expresses a percentage of purchase price which individuals normally associate with opportunity cost (the cost that could have been saved by investing that money in relatively safe investments such as money market funds) and also other holding costs such as property taxes, inventory theft losses, technician time to provide custodial care, rent space required to house the inventory, pro rata portions of heating, lighting, electricity,

insurance required to maintain the inventory values, and other items. These three costs (the unit cost, the ordering cost and the holding cost) must be considered in inventory purchasing and control.

Most individuals myopically consider only the first cost, that is, the unit cost in determining how many units to buy. However, the cost to order in terms of employee staff time, as well as the holding cost expressed as a percentage of the total purchase price, are also costs which must be interrelated. The basic economic order quantity model shows the interrelationship of the costs of ordering and holding. The formula which I am referring to, as well as a brief narrative of the explanation of key elements in the formula, is included in Exhibit I which is attached to this article.

Probably the best way to understand the economic order quantity formula without any variations on the formula, is to take an example. Assume that 960 units of a drug are used in your practice each year (a). The practice in the example incurs an ordering cost of approximately \$4.00 each time an order is placed (C_s). Because the practice could receive a return on investment of approximately 15% if the cash saved would be invested in a money market certificate and also various other costs involved for inventory losses through theft, technician time to house and provide custodial care, rent space for the drugs, and insurance costs also comprise about 10% of the total drug cost each year, the holding cost on an annual basis as a percent of purchase price in this hypothetical practice example is approximately 25% (b). The cost per unit to purchase from the drug salesman is approximately \$11.50 a unit (c). Utilizing the classic economic order quantity formula, assuming price changes are not considered, the optimum number of units which should be ordered each time your order is 52 units. This means approximately 18 times a year you should be ordering this drug to maximize your profit and minimize your cost considering both the ordering cost and the holding cost as it relates to the cost to purchase the drug.

Instead of spending your time counting individual items, you can forecast your probably drug and professional supply needs by doing nothing more than developing a purchase schedule of key drugs which you need utilizing economic order quantity. The schedule can be developed, maintained and changed as drug and professional supply costs increase.

Variations on the classic economic order quantity formula are also possible with utilization of a programmable calculator (Texas Instrument TI-59). With the aid of a more sophisticated calculator, you can determine the proper economic order quantity to purchase when there is an imminent price change occurring.

The classic economic order quantity formula provides a fantastic means for practitioners with the assistance of a \$12.00 calculator, to provide a more meaningful barometer for inventory purchasing recognizing annual demand, ordering costs, holding costs, and the interrelationship of these expenses to the cost per unit to order.

EXHIBIT I

CLASSIC ECONOMIC ORDER QUANTITY METHODOLOGY QUANTIFIED IN TERMS OF A MATHEMATICAL REPRESENTATION

$$EOQ = \sqrt{\frac{2a C_s}{bc}}$$

a = Annual Demand in Units

C_s = Ordering costs incurred per order —
(time involved in determining need to restock, place the order, internal control in reviewing shipping advice to actual quantity shipped and subsequently to invoice sent by supplier, shelving & unpacking)

c = Holding costs expressed on an annual basis as a % of purchase cost —
(interest rate required in current market conditions to be paid to borrow money to finance inventory, insurance costs to maintain the inventory, personal property taxes, inventory losses resulting from internal and external theft, technician time to provide custodial care, space required to house the inventory, prorata portion of heating, lighting, electricity (air conditioning))

c = Cost Per Unit to Purchase from Supply House

BASIC CONCEPT OF ECONOMIC ORDER QUANTITY

1. *GENERAL*. The "Economic Order Quantity" (EOQ) principle is a mathematically proven solution for arriving at the lowest total costs for ordering and holding inventory to meet expected supply requirements. In its most concise form, the economic order quantity principle can be stated in the formula: $Q = C \sqrt{Y}$. In words, this formula says that the "economic order quantity" (Q) is the square root of the value of annual requirements (Y) times a cost factor (C) which includes the cost to order and the cost to hold stock.

2. *INVENTORY LEVELS*. The EOQ principle is an integral part of inventory management. Therefore, this paragraph 2 describes the inventory levels involved in inventory management and relates the EOQ principle to the appropriate level.

a. *Leadtime, Operating, and Safety Levels.* Inventory management generally encompasses the functions of determining future supply requirements. As long as requirements continue to materialize for a particular item, the ordering and holding of inventory will be continued. This cyclic replenishment causes the inventory to be divided into three levels as shown in figure 1-2.1, below:

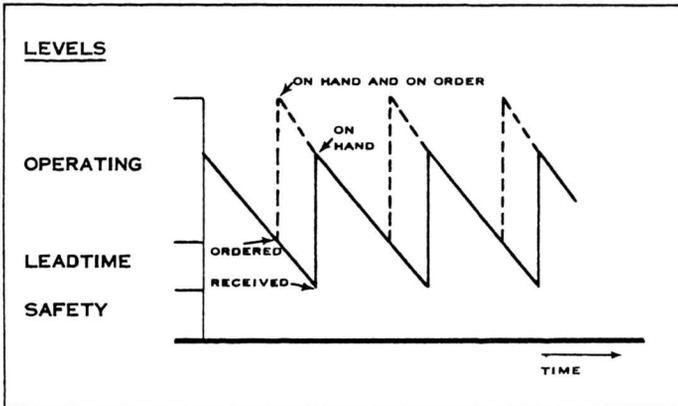


Figure 1-2.1 Replenishment Cycle and Inventory Levels

As indicated in figure 1-2.1, the operating level is expected to be issued between replenishment orders; the leadtime level is expected to be issued while the replenishment order is being prepared and delivery is being made; and the safety level is expected to be issued if the other levels are depleted.

b. *EOQ and the Operating Level.* The EOQ principle applies only to the operating level. Strictly speaking, it determines the economic quantity to order for the

operating level when it is replenished. However, if the leadtime and safety levels are below their required quantities, at the time of ordering replenishment, the order quantity must be increased to restore those levels. Figure 1-2.2, below, illustrates the computation of an order quantity based on the stock required to replenish the leadtime and safety levels as well as the operating level.

LEVELS	QUANTITY REQUIRED
Operating	30
Leadtime	10
Safety	10
Total	50
Less Available Stock	- 5
Net Replenishment to Order	45

Figure 1-2.2 Net Replenishment Order Quantity

3. *BALANCING OPPOSING COSTS.* The EOQ principle is based on balancing the opposing costs of ordering and holding stock to the maximum extent practicable in order to obtain the minimum total of these costs. Figure 103.1, below, illustrates the opposing costs for ordering and holding stock and the interrelationship of such costs.

Figure 1-3.1. Ordering and Holding Costs

Operating Level (Units)	Months of Supply	Holding Costs	Order Frequency per Year	Ordering Costs	Total Costs
20	1	\$1.00	12	\$60.00	\$61.00
40	2	2.00	6	30.00	32.00
60	3	3.00	4	20.00	23.00
80	4	4.00	3	15.00	19.00
120	6	6.00	2	10.00	16.00
240	12	12.00	1	5.00	17.00
480	24	\$24.00	*	*	\$26.50

*Note: The operating level of 24 months of supply would result in an order frequency of one order every other year. The ordering cost when averaged over a two year period would be \$2.50 and the total average cost for holding and ordering over the two year period would be \$26.50.

This table assumes that certain ordering costs are incurred each time an item is ordered and that certain holding costs are incurred for each unit held in stock. As the holding costs increase with the operating level, ordering costs decrease. Any reduction in one set of costs is opposed by an increase in the other. In order to find the most economical operating level, the lowest total cost for ordering and holding must be found. In this case, an operating level of 120, resulting in a total cost of \$16.00, is the most economical operating level of those shown in Figure 1-3.1.

- a. *Reason for Opposing Costs.* The reason for these opposing costs is that holding costs are based on months of supply for the operating level which are opposed to the resulting order frequency, which is the basis for ordering costs. As shown in Figure 103.1 holding costs increase with the months of supply and ordering costs increase with the order frequency per year but the order frequency decreases as the months of supply increase. In fact, doubling the months of supply in the operating level will cut the order frequency in half. This is known as an "inverse" or "reciprocal" relationship. Figure 103.2, below, illustrates the inverse relationship between months of supply and order frequency per year.

The upper chart shows how an operating level of four months of supply would have to be replenished three times a year (each peak representing a replenishment), while the lower chart cuts the operating level in half to two months of supply but in doing so, must double the

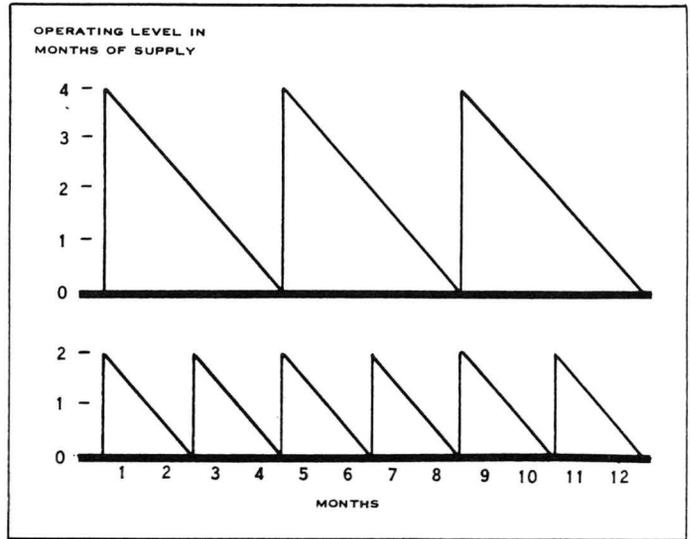


Figure 1-3.2. Months of Supply and Order Frequency

number of replenishments to six per year.

- b. *Lowest Total Cost.* If cost data like that in Figure 1-3.1 were plotted for every possible intervening operating level, Figure 1-3., below, would be the result.

SOURCE: The Economic Order Quantity Principle and Applications

A General Services Administration Handbook, Washington, D.C.

A copy can be obtained by writing the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

