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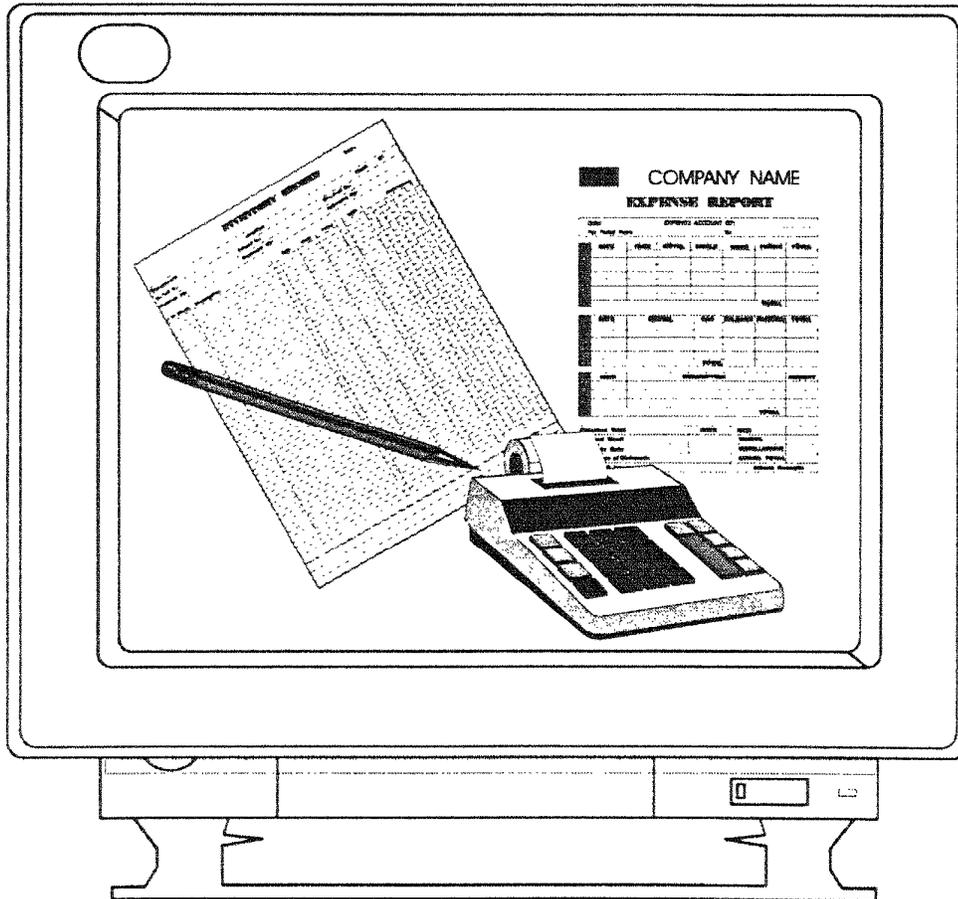
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FRAN: *Financial Ratio Analysis and More*

Version 1.0

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Abstract

FRAN is a computer-based, stand-alone, program designed to generate important financial and operating ratios from tax and wage forms filed with the Internal Revenue Service. **FRAN** generates standard profitability, financial/leverage, liquidity/solvency, and activity ratios, as well as unique measures of workforce and capital cost and acquisition. Information produced by the program is of use to bankers contemplating short-term loans, to bankers and investors contemplating extending long-term credit or taking an equity position, and to management in securing loans and evaluating operating performance.

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What is FRAN?

FRAN is a computer-based, stand-alone program designed to generate important financial and operating ratios. Input data for **FRAN** can be obtained from tax and wage forms filed with the Internal Revenue Service or extracted from a company's accounting and operating records.

Who Uses Financial and Other Ratios?

Financial ratios can tell much about the operation of a business. To the banker making a short-term cash loan, liquidity ratios reveal the firm's ability to make repayment. To the banker or investor contemplating a long-term credit or equity position, ratios can show the firm's earning power and/or operating efficiency. Other aspects of a business' operation of interest to management include inventory, accounts receivable, and workforce turnover and capital costs.

While ratios such as those for debt/equity, workforce turnover, and capital costs immediately convey meaningful information about a business, some work best when they are compared to "norms" generated from previous years or from similar published figures developed for other firms within an industry. Among the sources of financial information are: Robert Morris Associates' "Annual Statement Studies," Dunn and Bradstreet's "Industry Norms and Key Business Ratios," the "Leo Troy Almanac of Business and Industrial Financial Ratios," the Bureau of the Census's "Quarterly Financial Report for Manufacturing, Mining, and Trade Corporations," and the Internal Revenue Service's (IRS) "Statistics of Income, Corporation Income Tax Return." For a complete inventory of published ratios see Boyer and Gibson (1979). Published ratios should be used with caution. Cunningham and Rose (1995) compared financial ratios from Robert Morris Associates with those from Dunn and Bradstreet and found that ratios differed significantly between the two sources even within the same industry classification. With respect to choosing an industry norm, Keown et. al. (1994) suggested that a firm might do best by selecting four or five companies with whom it is familiar and use available information on these operations to establish standards for comparison.

How Many Ratios are There?

Although many ratios can be generated, there are 15 to 20 standard financial and operating ratios that summarize a company's performance. **FRAN** provides 17 traditional financial and operating ratios plus eight measures related to workforce and capital cost and acquisition.

Additional ratios often are redundant and represent alternative ways of measuring similar performance elements. For example, Ross et al. (1993) offered three measures that assess the extent to which debt is utilized: **debt ratio** (total debt/total assets), **debt-equity ratio** (total debt/total equity), and **equity multiplier** (total assets/total equity). The key to understanding the links among these measures is that total assets are equal to the sum of debt plus equity. In addition to these ratios that are purely of a financial nature, **FRAN** includes measures and estimates of operating performance of use to managers.

Locating Data for Use in FRAN

The IRS recognizes four basic types of business: C corporation, S corporation, partnership, and proprietorship. While each is taxed differently, all must file a tax return with the IRS. **FRAN** uses the information from the appropriate tax form for these businesses to construct various financial ratios and operating measures. The program's HELP menu includes worksheets indicating the required information that pertains to each type as well as to its location on the appropriate 1995 IRS forms W-3, 941, 1040 Schedule C, 1065, 1120, 1120S, and 4562 (see the Appendix).

System and Software Requirements

For optimal performance of **FRAN**, we recommend the following:

- * IBM or IBM-compatible PC with at least 2 megabytes of memory
- * MS-DOS version 4.01 or higher
- * 386 processor or greater
- * Hard disk drive with at least 2 megabytes of free space
- * Floppy disk drive (3.5 or 5.25 inch)
- * Color monitor

Installation Procedures

Follow these steps to install **FRAN**:

- * If you are running Windows or Windows 95, you must go to the DOS prompt and then to the root directory of your hard drive. To do this, type CD\ and press return.
- * Place the **FRAN** diskette in the disk drive and make it the current drive (type a: or b: and press ENTER).
- * Type INSTALL and press ENTER.
- * Follow directions given on the screen.

Using the Program

The main menu at the top of the screen lists File, Inputs, Window, Print, Options, and Help. In the File submenu, the first four commands, New, Open, Close, and Name, are the most important in using **FRAN**. Choose New to create a file. This brings up an output display for entering actual values that are obtained from the appropriate IRS tax return for your firm. This Financial Ratios and Measures screen initially shows asterisks except for the zero for average employment, which is not a computed value.

To enter data, choose Inputs from the main menu and complete the various fields. When the data have been entered, the Financial Ratios and Measures screen will display the constructed ratios and measures. To save a newly created file, choose Name from the File submenu; you may use up to eight characters in naming the file.

Should you wish to view values for a sample file, choose Open from the File submenu and type "example." Do this also to retrieve any previously created and stored file using its name.

You may print only a file that is on the screen. To do so, choose Print from the main menu (make sure that your printer is turned on to avoid an error message and/or rebooting your computer). If you want a printout to include your name and the name of your organization, first choose the Options menu and enter the information in the appropriate boxes. All printouts will include the system date stored in your computer. To leave the program, choose Exit from the File submenu.

The information sheets in the Help submenu that list the types and location of data from 1995 IRS forms that are required to use **FRAN** will be updated each year as necessary and incorporated into the program. To obtain future revisions of **FRAN**, write to the authors at the Northeastern Forest Experiment Station, 241 Mercer Springs Road, Princeton, WV 24740.

FRAN Outputs

The 25 financial ratios and operating measures constructed by **FRAN** are classified by type as follows:

- * Profitability ratios (4)
- * Financing/leverage ratios (5)
- * Liquidity/short-term solvency (2)
- * Activity ratios (6)
- * Workforce measures (4)
- * Capital cost and acquisition (4)

The 17 ratios or some version thereof are explained in most financial and accounting texts. The references listed at the end of this publication and similar sources are available at you local college or public library. The eight measures related to workforce and capital cost and acquisition are unique to the **FRAN** program.

Interestingly, there is much disagreement and/or confusion among published texts as to how the standard financial measures should be categorized. For example, Keown et al. (1994) categorized both accounts receivable and inventory turnover measures twice, once as measures of liquidity and once as profitability ratios. Asset turnover (net sales/total assets) is categorized differently in three of four texts: under profitability by Keown et al. (1994), as a liquidity measure by Hermanson et al. (1992), and as an activity ratio by Ross et al. (1993) and Weston and Brigham (1975).

We reviewed these and other texts and their approaches to categorizing each of our financial ratios. We wanted to place each measure in the category used by the majority of authors. Obviously, arguments can be made for placing certain measures in other categories. What is important is the information is conveyed by the measure itself in the overall context of a business and its operation.

Ratios and Performance Measures

Profitability Ratios

Gross margin on sales. Also known as gross profit, gross margin on sales is the amount that is left after the cost of goods sold is deducted from net sales. It can be thought of as the markup on sales. It is derived as:

$$\text{[Gross profit / net sales]}$$

Return on sales. Return on sales is derived as:

$$\text{[Net operating income / net sales]}$$

where:

$$\text{Net operating income} = \text{[(Net income - nonoperating income) + interest expense]}$$

Interest expense is included in net operating income so that decisions affecting differences in capital structure among firms are negated.

Return on assets (investment). This is a measure of return on investment (ROI) or, as defined by Keown et al. (1994), the operating income return on investment (OIROI). It measures the return to the total investment, and indicates the earning power of a company in terms of a bundle of assets. This measure sometimes is calculated by dividing after-tax income by total assets, or by dividing before-tax income and interest by total assets. For our purposes, is derived as:

$$\text{[Net operating income / total assets]}$$

Return on equity. From a stockholder's or potential investor's point of view, return on equity is an important measure of a company's ability to produce income. Return on equity is particularly useful when seeking to compare a firm's performance with other investment opportunities or with other companies in the same industry. It is derived as:

$$\text{[Net operating income / equity]}$$

Financing/Leverage Ratios

Equity ratio. This measure reveals the degree to which the overall investment is financed by equity. A value near 1.0 indicates nearly complete owner financing, which from a creditor's point of view is most desirable. However, to the owner, debt can be desirable as it allows the company to generate greater profits so long as the returns exceed the cost of debt. Likewise, excessive debt can be dangerous, particularly during periods of recession. Failure to make interest payments can force a company into liquidation. Equity ratio is derived as:

$$\text{[Equity / total assets]}$$

Fixed assets/equity. This measure reveals how much equity is invested in fixed assets. Its purpose is to determine whether the investment in fixed assets has been furnished by the owner. Theoretically, it is preferred that owners provide all of the capital required for the plant and some toward the daily operation of the business. The lower the ratio, the greater the degree of liquidity and the greater the degree of autonomy for the owners. The lower the ratio, the more owner's capital is available to meet debt obligations, payrolls, and carry receivables. It is derived as:

$$\text{[(Total assets - current assets) / equity]}$$

Current liabilities/equity. This measure compares what is owed by the firm in the short-term (within a year) to what is owned by the firm. A ratio above 0.8 is considered undesirable. It is derived as:

$$\text{[Current liabilities / equity]}$$

Debt/equity. This is commonly known as the debt ratio. A value of 1.0 indicates the owners and creditors have an equal stake in the business. Usually, the higher the debt ratio, the more

influence creditors have over the business' operation and the more difficult it is to borrow additional funds. It is derived as:

$$[(\text{Long-term debt} + \text{current liabilities}) / \text{equity}]$$

Some analysts use only long-term debt to compute this ratio; they believe that short-term debts, (i.e., current liabilities) are not part of the capital structure of the business since they are paid within the year.

Times-Interest-earned. Also known as the "interest coverage ratio," this is a rough measure of cash inflows versus cash outflows to cover interest expenses. The larger this ratio, the easier it should be for a firm to meet its interest obligations. Of particular interest to creditors, this measure is derived as:

$$[(\text{Net operating income} + \text{interest expense}) / \text{interest expense}]$$

Liquidity/Short-Term Solvency

Current ratio. Also known as the "working capital" ratio, this is a measure of the liquid assets available to meet all debts falling due within a year. It is a reflection of a company's working capital position. Short-term creditors are particularly interested in this ratio since inventories and accounts receivable are the primary items from which the company obtains cash to pay short-term credit obligations. A ratio that is too high may indicate slow-paying customers and/or slow-moving inventories. Too many dollars needlessly tied up in current assets can affect net income. Current ratio is derived as:

$$[\text{Current assets} / \text{current liabilities}]$$

Quick ratio. Also known as the "acid test" ratio, this measure is similar to the current ratio in that it indicates a firm's ability to meet current liabilities. It differs from the current ratio in that it excludes inventories from current assets. Inventories generally are considered the least liquid of all current assets. Their book value is sometimes overstated, especially where a quick sale might be necessary to meet creditor demands. Consequently, the quick ratio indicates the firm's ability to meet current liabilities without relying on the sale of inventories. It is derived as:

$$[(\text{Current assets} - \text{inventory}) / \text{current liabilities}]$$

Activity Ratios

Accounts receivables turnover. This is a measure of how well accounts receivable are being serviced. The higher the ratio, the more quickly sales on account are being paid off. It is derived as:

$$[\text{Net sales} / \text{accounts receivable}]$$

Collection period (days). This is a measure of how long, on average, money is tied up in credit sales. It is derived as:

$$[\text{Accounts receivable} / (\text{net sales} / 365)]$$

Inventory turnover. Similar in concept to accounts receivable turnover, inventory turnover measures the degree to which inventories are being used. A value below the industry average may suggest that inventories are obsolete, damaged, or otherwise difficult to move. A value above the industry average may suggest the company is carrying too little inventory and thereby incurring larger than normal order costs, loss of quantity discounts, and stock-outs. Inventory ratio is derived as:

$$[(\text{Net sales} - \text{gross profit}) / \text{inventory}]$$

Inventory (days). This is a measure of inventory in terms of daily sales. Like the collection period for receivables, it provides another way to view inventory activity. A value above the industry average or above that recorded in previous periods may suggest outdated goods and other problems. It is derived as:

$$[\text{Inventory} / ((\text{net sales} - \text{gross profit}) / 365)]$$

Asset turnover. This is a measure of the efficiency with which assets are used to generate sales. The larger the ratio, the larger the income from each dollar invested in assets. A value below the industry average may indicate certain inefficiencies and suggest that the firm is not generating the volume of business its investment would warrant. It is derived as:

$$\text{[Net sales / total assets]}$$

Fixed asset turnover. This is a measure of the degree to which a firm's fixed assets are being utilized. A value below the industry average may suggest an underutilization of the firm's fixed assets. A value above the industry average may suggest the firm is nearing capacity. It is derived as:

$$\text{[Net sales / (total assets - current assets)]}$$

Workforce Measures

Sales/employee This measure provides insight into the contribution of the average worker. It is derived as:

$$\text{[Net sales / average number of employees]}$$

Average payroll. This measure provides an indication of average annual employee compensation. Differences among regions partially reflect differences in labor markets. Differences among business types may reflect differences in employee contributions and skills. It is derived as:

$$\text{[Payroll / average number of employees]}$$

Average employment. This is the average number of people employed during the year taken directly from IRS form 941—the employer's quarterly federal tax return.

Employee turnover. This measure indicates the rate of employee turnover. High turnover rates usually are costly in recruitment costs and training costs and overall inefficiency. It is derived as:

$$\text{[Total number of employees / average number of employees]}$$

Capital Cost and Acquisition

Cost of capital. A rough estimate of the average weighted cost of short- and long-term debt, cost of capital may exclude some interest bearing obligations included among current liability accounts such as accounts payable. It does not indicate the current cost of capital but the average cost of all indebtedness, past and present. Cost of capital is derived as:

$$\text{[Interest expense / (long-term debt + short-term debt)]}$$

Asset additions. This is a measure of additions to fixed assets expressed as a percentage of a company's current fixed assets. It is derived as:

$$\text{[Asset additions / (total assets - current assets)]}$$

Asset additions/depreciation. This is a measure of the degree to which fixed asset additions are replacing those that have been "used up." Because of inflation and differences in the treatment of depreciation, a value of 1.0 may not always indicate full replacement. However, anything significantly below this value would suggest possible disinvestment while a value significantly above 1.0 would suggest an expansion. It is derived as:

$$\text{[Asset additions / depreciation]}$$

Asset additions/net sales. This is a measure of the level of new investment in fixed assets in relation to net sales. This ratio should remain fairly constant across company size as measured by net sales. It is derived as:

$$\text{[Asset additions / net sales]}$$

Du Pont System

The Du Pont system, a frequently mentioned technique (Ross et al. 1993; Keown et al. 1994; Weston and Brigham 1975), is used to more closely analyze return on assets/investment and return on equity by looking at their respective components. This system originally brought together **return on sales** (a profitability ratio) and **asset turnover** (an activity ratio) to illustrate how these ratios combined to determine return on investment. The Du Pont formula is:

$$\text{Return on assets/investment} = [(\text{Net operating income} / \text{net sales}) \\ * (\text{net sales} / \text{total assets})]$$

The first part of this equation is **return on sales**; the second is **asset turnover**. Thus, **return on assets**, while identical for two entities, may differ significantly with regard to margin and sales volume. For example, food retailers have a low markup but a higher volume of net sales to assets, i.e., **asset turnover**, while jewelers operate with high markup but relatively lower volumes of net sales to assets.

The original Du Pont System has been extended to show how firms with the same **return on assets/investment** can have different **returns on equity** due to differences in their debt/equity structure. Thus, if a firm has substantial debt relative to equity (a low equity to total asset ratio), its return on equity will be higher than a firm that is less leveraged (has less relative debt). This extended formula is:

$$\text{Return on equity} = [(\text{return on assets/investment}) / (\text{equity} / \text{total assets})]$$

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Appendix

Location of IRS Tax Form Information

C Corporation

Item	Form/schedule/column ¹	Location ²
Total assets	F-1120	P-1,B-D
Net sales	F-1120	P-1,L-1c
Gross profit	F-1120	P-1,L-3
Net income	F-1120	P-1,L-28
Nonoperating income	F-1120	P-1,SL-8,# 9, #10
Interest expense	F-1120	P-1,L-18
Current assets	F-1120,S-L,C-d	P-4,SL-1,#2b,#3,#4,#5,#6
Current liabilities	F-1120,S-L,C-d	P-4,SL-16,#17,#18
Short-term debt	F-1120,S-L,C-d	P-4,L-17
Long-term debt	F-1120,S-L,C-d	P-4,SL-19,#20,#21
Equity	F-1120,S-L,C-d	P-4,SL-22b,#23,#24,#25,#26
Accounts receivable	F-1120,S-L,C-c	P-4,L-2a
Inventory	F-1120,S-L,C-d	P-4,L-3
Depreciation	F-4562	P-1,L-21
Asset additions	F-4562,C-c	P-1,SL-15a-h, 16a-c
Total payroll	F-W3	P-1,B-1
Total number of employees	F-W3	P-1,B-c
Average number of employees	F-941	P-1,L-1 (any quarter)

¹ F=forms; S=schedule; C=column.

² P=page; B=block; L=line; SL=sum of lines.

S Corporation

Item	Form/schedule/column ¹	Location ²
Total assets	F-1120S	P-1,B-E
Net sales	F-1120S	P-1,L-1c
Gross profit	F-1120S	P-1,L-3
Net income	F-1120S	P-1,L-21
Nonoperating income	F-1120S	P-1,SL-4,#5
Interest expense	F-1120S	P-1,L-13
Current assets	F-1120S,S-L,C-d	P-4,SL-1,#2b,#3,#4,#5,#6
Current liabilities	F-1120S,S-L,C-d	P-4,SL-16,#17,#18
Short-term debt	F-1120S,S-L,C-d	P-4,L-17
Long-term debt	F-1120S,S-L,C-d	P-4,SL-19,#20,#21
Equity	F-1120S,S-L,C-d	P-4,SL-22,#23,#24,#25
Accounts receivable	F-1120S,S-L,C-c	P-4,L-2a
Inventory	F-1120S,S-L,C-d	P-4,L-3
Depreciation	F-4562	P-1,L-21
Asset additions	F-4562,C-c	P-1,SL-15a-h, 16a-c
Total payroll	F-W3	P-1,B-1
Total number of employees	F-W3	P-1,B-c
Average number of employees	F-941	P-1,L-1 (any quarter)

¹ F=forms; S=schedule; C=column.

² P=page; B=block; L=line; SL=sum of lines.

Partnership or Limited Liability Co.

Item	Form/schedule/column ¹	Location ²
Total assets	F-1065	P-1,B-f
Net sales	F-1065	P-1,L-1c
Gross profit	F-1065	P-1,L-3
Net income	F-1065	P-1,L-22
Nonoperating income	F-1065	P-1,SL-6,#7
Interest expense	F-1065	P-1,L-15
Current assets	F-1065,S-L,C-d	P-4,SL-1,#2b,#3,#4,#5,#6
Current liabilities	F-1065,S-L,C-d	P-4,SL-15,#16,#17
Short-term debt	F-1065,S-L,C-d	P-4,L-16
Long-term debt	F-1065,S-L,C-d	P-4,SL-18,#19,#20
Equity	F-1065,S-L,C-d	P-4,L-21
Accounts receivable	F-1065,S-L,C-c	P-4,L-2a
Inventory	F-1065,S-L,C-d	P-4,L-3
Depreciation	F-4562	P-1,L-21
Asset additions	F-4562,C-c	P-1,SL-15a-h, 16a-c
Total payroll	F-W3	P-1,B-1
Total number of employees	F-W3	P-1,B-c
Average number of employees	F-941	P-1,L-1 (any quarter)

¹ F=forms; S=schedule; C=column.

² P=page; B=block; L=line; SL=sum of lines.

Proprietorship

Item	Form/schedule/column ¹	Location ²
Total assets	Not available	Not available
Net sales	F-1040,S-C	P-1, L-3
Gross profit	F-1040,S-C	P-1, L-5
Net income	F-1040,S-C	P-1, L-29
Nonoperating income	F-1040,S-C	P-1, L-6
Interest expense	F-1040,S-C	P-1, L-16a-b
Current assets	Not available	Not available
Current liabilities	Not available	Not available
Short-term debt	Not available	Not available
Long-term debt	Not available	Not available
Equity	Not available	Not available
Accounts receivable	Not available	Not available
Inventory	F-1040,S-C	P-2,L-39
Depreciation	F-4562	P-1,L-21
Asset additions	F-4562, C-c	P-1,SL-15a-h, 16a-c
Total payroll	F-W3	P-1,B-1
Total number of employees	F-W3	P-1,B-c
Average number of employees	F-941	P-1,L-1 (any quarter)

¹ F=forms; S=schedule; C=column.

² P=page; B=block; L=line; SL=sum of lines.

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