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FINANCIAL HIEROGLYPHICS - THE NUMBERS "SPEAK" TO ME

Background

Hieroglyphics are enigmatic to all but Egyptian archaeologists who claim that "…*the hieroglyphics speak to me*." However, they only "speak" to skilled archaeologists who are deeply trained and experienced and know how to look beyond and behind their meaning.

Likewise, financial statements contain abundant data, some of which is self-evident. But more probative data can be "coaxed" from the financials if the pertinent forensic accounting techniques are applied.

This article summarizes some of the 300-odd forensic accounting techniques that reveal the "real" financial position and outlook that would otherwise be undiscerned.

"Unbalanced" Financial Statements

A subtle "imbalance" exists within today's financial statements. That is, although the balance sheet and income statement can be traced back at least 500+ years[1], today's cash flow statement has been in place less than 25 years[2].

Despite the rich potential for the cash flow statement's contents it is usually diluted since most companies opt to report via the "indirect" versus the "direct" method. Consequently, the cash flow statement's forensic accounting application is still under development.

90-Second Assessment

Financial statement veracity is first determined by a "90-second" assessment. Then, depending upon preliminary findings further drill-down can be determined.

First, *scan* the audit opinion and determine whether to review it based upon the following guidance: If the opinion is comprised of only 1 or 2 paragraphs, don't read it - it contains standard language. If the audit opinion contains 3 paragraphs, read the 3rd paragraph. If the audit opinion contains 4 paragraphs, read the 3rd and 4th paragraphs *carefully*. If it contains 5 paragraphs get *very* interested, etc. Generally, the more caveats contained in the opinion the less reliability contained within the financials.

Second, observe any below-the-line items on the balance sheet and the income statement. The *descriptor* used for line items can be very telling. For example, a public

[1] The balance sheet and income statements can be traced to Luca Pacioli, a 15th century Franciscan Monk credited with formalizing the double-entry method of accounting in his 1494 treatise, *Summa de Arithmetica, Geometria, Proportioni et Proportionalita*.
[2] FAS No. 95, *Statement of Cash Flows*, issued November 1987.

company has been reporting ***one-time*** extraordinary write-offs for operations for 7 of the last 10 years! Even though their audit opinion appears standard it indicates potential reporting "management."

Third, count/compare the footnotes. That is, if Year 1 contains 22 footnotes and Year 2 also contains 22 footnotes that may indicate few significant changes. However, it is still necessary to compare the content of each footnote. For example, if Year 1, footnote 11 contains 1 paragraph, but the same Year 2 footnote contains 5 paragraphs, they need to be scrutinized.

Cash Is King

Regardless of your 90-second assessment findings your next step should be to conduct a cash realization ratio. The cash flow statement is arguably the single, most important financial statement by which to assess veracity. Also, it is considered the most "difficult" statement to misstate, particularly over time.

The reasons for such focus relate to the "articulated" nature of the balance sheet, income statement and the cash flow statement. That is, if a transaction is reported within the balance sheet and/or income statement it will be reflected in the cash flow statement. Therefore, you can expect a strong correlation between "reported" net income and "resultant" cash from operations.

Naturally, a lag may occur due to the accrual nature of net income, and cash might be impacted by capital structure changes. Nonetheless a correlation should be discernable, thus lending strength to reported net income.

There are various forms of cash realization ratios, but they are generally expressed similar to the following formula.

Cash Realization Ratio (**CRO**) = Operating Cash / Net Income.

CRO measures the ratio of operating cash in Year 1 relative to net income in Year 1. The measurements will vary greatly by industry and will usually be less than 1.0. However, the subject company's ratio should remain relatively consistent and ideally should increase over time.

More precise measurements will be obtained using quarterly financials and can highlight end-of-year declines that suggest earnings management.

Other Key Techniques

Other key (but by NO means exhaustive) analytical techniques are detailed in "The Detection of Earnings Management[3]," by Professor Messod D. Beneish, Indiana University. Professor Beneish's paper delineates his "M" Score (not reproduced here) which has some similarities to the Altman "Z" Score, but comprises non-bankrupt entities. The following items summarize Professor Beneish's findings.

[3] www.bauer.uh.edu/~swhisenant/**beneish**%20earnings%20**m**g**m**t%20**score**.pdf

Asset Quality Index (**AQI**) =

$$\frac{1-((\text{Current Assets}_{t} + \text{PPE}_{t}) / \text{Total Assets}_{t})}{1-((\text{Current Assets}_{t-1} + \text{PPE}_{t-1}) / \text{Total Assets}_{t-1})}$$

AQI measures the ratio of asset quality in year "t," relative to asset quality in year "t-1." If AQI is greater than 1.0 it indicates a potential increase in cost deferral and/or perhaps an increase in intangible assets resulting from acquisitions.

AQI measures the ratio of non-current assets *other* than property, plant and equipment (PPE), to total assets. It indicates the proportion of total assets which are potentially less certain. Therefore, one can expect a positive relation between AQI and the probability of earnings manipulation.

Depreciation Index (**DI**) =

$$\frac{\text{Depreciation}_{t-1} / (\text{Depreciation}_{t-1} + \text{Net PPE}_{t-1})}{\text{Depreciation}_{t} / (\text{Depreciation}_{t} + \text{Net PPE}_{t})}$$

DI measures the ratio of the *rate* of depreciation in year "t-1" to the rate of depreciation in year "t." The depreciation rate is comprised of depreciation expense and net PPE.

A DI greater than 1.0 suggests that the rate of depreciation has slowed, thus indicating changes to estimated useful lives or new methods. Therefore, one can expect a positive relation between DI and the probability of earnings manipulation.

Days Sales in Receivables Index (**DSRI**) =

$$\frac{(\text{Receivables}_{t} / \text{Sales}_{t})}{(\text{Receivables}_{t-1} / \text{Sales}_{t-1})}$$

DSRI measures the ratio of days' sales in receivables in year "t" to days' sales receivables in year "t-1." Assuming that major changes in credit policies have not occurred the measure indicates whether receivables and revenues are in or out of balance in two consecutive years.

Gross Margin Index (**GMI**) =

$$\frac{(\text{Sales}_{t-1} - \text{CGS}_{t-1}) / \text{Sales}_{t-1}}{(\text{Sales}_{t} - \text{CGS}_{t}) / \text{Sales}_{t}}$$

GMI measures the ratio of gross margin in year "t-1" to gross margin in year "t." When GMI is less than 1.0 gross margin has deteriorated which could indicate skimming of

receipts. When GMI is greater than 1.0 gross margin has increased which could indicate earnings manipulation.

Sales Growth Index (**SGI**) =

$$\text{Sales Growth Index} = \text{Sales}_{t} / \text{Sales}_{t-1}$$

SGI measures the ratio of sales in year "t" to sales in year "t-1." Pressure to achieve results can result in overstating sales via various means.

SGA Expenses Index (**SGAEI**) =

$$\frac{\text{SGAEI}_{t} / \text{Sales}_{t}}{\text{SGAEI}_{t-1} / \text{Sales}_{t-1}}$$

SGAEI (Selling General and Administrative Expense Index) measures the ratio of SGAEI in year "t" to SGAEI in year "t-1." A disproportionate increase in sales unexplained by events such as a major acquisition can indicate manipulation.

Leverage Index (**LI**) =

$$\frac{(\text{LTD}_{t} + \text{Current Liabilities}_{t}) / \text{Total Assets}_{t}}{(\text{LTD}_{t-1} + \text{Current Liabilities}_{t-1}) / \text{Total Assets}_{t-1}}$$

LI is the ratio of total debt to total assets in year "t" to the ratio of total debt to total assets in year "t-1." LI greater than 1.0 indicates an increase in leverage. The index may identify debt covenant constraints affecting earnings manipulation. Therefore, it may implicitly measure the leverage forecast error.

Total Accruals to Total Assets (**TATA**) =

$$\frac{((\text{Current Assets}_{t} - \text{Cash}_{t}) - (\text{Current Liabilities}_{t} - \text{Current LTD}_{t} - \text{Income Taxes Payable}_{t})) - ((\text{Current Assets}_{t-1} - \text{Cash}_{t-1}) - (\text{Current Liabilities}_{t-1} - \text{Current LTD}_{t-1} - \text{Income Taxes Payable}_{t-1})) - \text{Depreciation \& Amortization Exp}_{t}}{\text{Total Assets}_{t}}$$

TATA is comprised of the change in working capital, less cash and depreciation/amortization. Year-to-year changes may indicate earnings manipulation resulting from management accrual decisions, particularly short-term decisions. Higher positive accruals (excluding cash) are correlated to earnings manipulation likelihood.

Conclusion

Forensic accounting techniques are similar to medical techniques. That is, a physician assesses his patient's health by observing the measures, e.g. cholesterol, BMI, et al

against 2 benchmarks: the patient's personal history (i.e. is the patient's cholesterol improving or worsening), and the patient's peer group, e.g. 43-year old Caucasian females.

Likewise, forensic accounting techniques can wring the best out of the financial statements.

As I was thinking about this issue a new paper by Prof. Beneish landed in my inbox (http://papers.ssrn.com/sol3/papers.cfm?abstract_id=100684).
In this new paper Beneish explores the use of the M score as a stock selection technique. Beneish examines portfolio deciles based around his M score over the period 1993-2003 with annual rebalancing done four months after the financial year end.

The results are impressive. When using market and size adjusted returns the M score strategy generates a hedged return of nearly 14% p.a. Using the Fama and French 3 factor model (market, size and style adjusted) , the stocks with the worst M scores show a -12% return, whilst the stocks with the best M scores show a 4% return, generating a long/short return of 16% (of course).

In the last year I have had many conversations with traditional long only fund managers who were setting up internal hedge funds or 130/30 style products. They were often surprised when I suggested that the shorts were not just the opposite of their longs. Shorting requires a different discipline. Perhaps using the M score might offer up a short list of potential candidates.

With earnings at a cyclical peak, finding out who has been fudging their numbers could be a particularly useful pursuit. Sadly, I don't have the data to run this screen from here, but perhaps a call to your favourite quant analyst might be in order (if that happens to be Andy Lapthorne, then you are out of luck as I know he, like me, is enjoying his garden at the moment).

INDICATOR	COMPOSITION	COMMENTS
Asset Quality Index (**AQI**) $1-\frac{((\text{Current Assets}_t + \text{PPE}_t)}{\text{Total Assets}_t)}{1-\frac{((\text{Current Assets}_{t-1} + \text{PPE}_{t-1})}{\text{Total Assets}_{t-1})}}$	AQI measures the ratio of asset quality in year "t," relative to asset quality in year "t-1." If AQI is greater than 1.0 it indicates a potential increase in cost deferral and/or perhaps an increase in intangible assets resulting from acquisitions. AQI measures the ratio of <u>non</u>-current assets *other* than property, plant and equipment (PPE), to total assets. It indicates the proportion of total assets which are potentially less certain. Therefore, one can expect a positive relation between AQI and the probability of earnings manipulation.	
Depreciation Index (**DI**) $\frac{\text{Depreciation}_{t-1} / (\text{Depreciation}_{t-1} + \text{Net PPE}_{t-1})}{\text{Depreciation}_t / (\text{Depreciation}_t + \text{Net PPE}_t)}$	DI measures the ratio of the *rate* of depreciation in year "t-1" to the rate of depreciation in year "t." The depreciation rate is comprised of depreciation expense and net PPE. A DI greater than 1.0 suggests that the rate of depreciation has slowed, thus indicating changes to estimated useful lives or new methods. Therefore, one can expect a positive relation between DI and the probability of earnings	

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	manipulation.	
Days Sales in Receivables Index (**DSRI**) $\frac{Receivables_t / Sales_t}{Receivables_{t-1} / Sales_{t-1}}$	DSRI measures the ratio of days' sales in receivables in year "t" to days' sales receivables in year "t-1." Assuming that major changes in credit policies have not occurred the measure indicates whether receivables and revenues are in or out of balance in two consecutive years.	
Gross Margin Index (**GMI**) $\frac{(Sales_{t-1} - CGS_{t-1}) / Sales_{t-1}}{(Sales_t - CGS_t) / Sales_t}$	GMI measures the ratio of gross margin in year "t-1" to gross margin in year "t." When GMI is less than 1.0 gross margin has deteriorated which could indicate skimming of receipts. When GMI is greater than 1.0 gross margin has increased which could indicate earnings manipulation.	
Sales Growth Index (**SGI**) Sales Growth Index= $Sales_t / Sales_{t-1}$	SGI measures the ratio of sales in year "t" to sales in year "t-1." Pressure to achieve results can result in overstating sales via various means.	Compare to raw sales; significant increase may signal a year exhibiting overstatement. Equivalent to year-to-year percentage change comparison.

INDICATOR	COMPOSITION	COMMENTS
SGA Expenses Index (**SGAEI**) $\frac{SGAEI_t / Sales_t}{SGAEI_{t-1} / Sales_{t-1}}$	SGAEI measures the ratio of SGAEI in year "t" to SGAEI in year "t-1." A disproportionate increase in sales unexplained by events such as a major acquisition can indicate manipulation.	
Leverage Index (**LI**) $\frac{\frac{LTD_t + Current\ Liabilities_t}{Total\ Assets_t}}{\frac{LTD_{t-1} + Current\ Liabilities_{t-1}}{Total\ Assets_{t-1}}}$	LI is the ratio of total debt to total assets in year "t" to the ratio of total debt to total assets in year "t-1." LI greater than 1.0 indicates an increase in leverage. The index may identify debt covenant constraints affecting earnings manipulation. Therefore, it may implicitly measure the leverage forecast error.	

INDICATOR	COMPOSITION	COMMENTS
Total Accruals to Total Assets (**TATA**) ((Current Assets $_t$ - Cash $_t$**)** – (Current Liabilities $_t$ - Current LTD $_t$ - Income Taxes Payable $_t$)) – ((Current Assets $_{t-1}$ - Cash $_{t-1}$**)** – (Current Liabilities $_{t-1}$ - Current LTD $_{t-1}$ - Income Taxes Payable $_{t-1}$**)**) – Depreciation & Amortization Exp $_t$ _____ Total Assets $_t$	TATA is comprised of the change in working capital, less cash and depreciation/amortization. Year-to-year changes may indicate earnings manipulation resulting from management accrual decisions, particularly short-term decisions. Higher positive accruals (excluding cash) are correlated to earnings manipulation likelihood.	
Beneish' "M" Score: **M = -4.84+0.92*DSRI+0.528*GMI+0.404*AQI+0.892*SGI+0.115*DEPI-0.172*SGAI+4.679*TATA-0.327*LVGI** A score greater than -2.22 indicates a strong likelihood of a firm being a manipulator. In his out of sample tests, Beneish found that he could correctly identify 76% of manipulators, whilst only incorrectly identifying 17.5% of non-manipulators.		