Measurement of Debt-paying Ability

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27th January, 2016 (short-term); 3rd February, 2016 (long-term)

Introduction

Paying off debts is just as integral to the success of a company as obtaining the debts in the first place. As liabilities such as loans are often intricate and involve some strict terms and sanctions, it's important that companies audit other companies well before deciding on the terms of either short-term or long-term loans.

1 Short-term Debt

The ability of an organisation to be able to pay off short-term debts is crucial to long-term survival of the company. Not only does the ability to pay off short-term loans lend the ability to hence pay off longer-term loans and investments, but it also satisfies the stockholders of the company and ensures that the company avoids entering bankruptcy. The ability to turn over a profit is not just enough to survive.

A company must be able to maintain a careful balance between its resources (*"current assets"*) and its expenditures (*"current liabilities"*). A company is still able to at least meet some short-term obligations if it is making a loss, as long as it has the ability to pay off its debts - companies cannot survive without adequate liquidity (ie. money in the bank, or liquid assets which can be easily converted to cash).

The **Operating Cash Cycle** will be very short for retail or wholesale-based firms - the stages of the OCC are simply the purchase of inventory, and the sale to customers, and this in itself will almost always produce some guaranteed profit for the company. For something like manufacturing, however, the OCC will be longer, as there are intermediate steps in which the assets are modified or consumed in some way, which will not only incur additional monetary overhead, but also consume more time. The general stages of a manufacturing OCC are the *purchase*, *production*, *sale* and *collection*. In general the duration of the OCC is to be minimised to ensure both that the company is financially stable, and is not liable to unpredictable financial interruptions - the longer the period of the OCC, the greater the share of a business' total funds must be applied to working capital.

1.1 Current Assets

Current Assets are either literal cash, or anything that can be realised as cash within the current OCC (which includes anything that would *prevent* further spending, rather than just produce cash). Current Assets include *receivables*, *prepayments*, cash, idle inventory and anything else (such as things currently held for sale) which still hold value on their own. When cash is being classified as a current asset, it must be *current* (accessible to the company now) and ideally unrestricted (available to pay creditors). If cash is restricted in any way, it may still be reported as current, but the restrictions must be disclosed.

Operating Cash Cycle: *The time between making an investment into some initial resources (ie. acquisition of goods) and the realisation of cash from the sale of that product.*

Compensating Balance is a minimum amount of money that a bank will require a lender to put on deposit in order to maintain a loan. It has the effect of reducing the net amount loaned by the bank while ensuring that the interest paid by the loaner remains the same, which effectively increases the interest rate of the borrower. Compensating Balance counts as part of the current assets of a bank, as it compensates for short-term expenditure and loans that the bank offers. However, it can also be reported as a non-current asset if it is needed to compensate for long-term expenditure (ie. if the bank intends to offer a long-term loan).

Short-term investments are also a valid current asset. It's wise to not only keep some amount of liquidity as cash, but also be productive and retain it in something that might also generate additional revenue for

the company. Short-term investments should be *readily marketable*, which means there is managerial intent to convert it back into cash (or be able to) by the end of the current operating cash cycle (or financial year). Showing that investments are made in this way increases the liquidity of a company. Short-term investments should always be temporary, and might take the form of treasury bills (a secure form of investing in the government for some small but guaranteed return), shares/stocks in another company, or bonds (which are like treasury bills, but with interest).

1.1.1   Valuation and Impairment

For valuating a receivable, if the receivable is short-term, ignore any fund use for delayed collection as the difference is generally negligible; however, if the receivable is long-term and classified as an investment then it shall not be ignored. If the company suspects they will not receive money for a receivable (ie. it's noncollectable) then the company must estimate the "bad debt" - this process is known as *impairment*, and is done only when you assume that the debtor will not pay up.

One method of impairment is *accruement*, which occurs when a company fails to pay a debt for some duration of time. The realizable value of a receivable is estimated, and the outstanding debt is credited to Accounts Receivable from the company's **allowance**. Another method is *direct write-off*, used when the receivables are immaterial (eg. digital goods) or the amount for accrual can't be estimated. This is a way of recognising bad debt when it's realised for certain that the debt is noncollectable - you just debit a *bad debt expense* for however much was lost, and credit Accounts Receivable to write off the remaining expense of what was owed. The crucial difference between the above two is that the allowance method takes place whether the debtor files for bankruptcy or not.

Typically, trade receivables are collected within the month. *Installment* receivables have significantly longer collection time than trade receivables, and thus are considered lower quality (where *quality* refers to the likelihood of collection without being turned into bad debt) - they are typically recorded as a *current asset* due to their longer (but still technically short-term) duration. A debtor must be held to a high standard (eg. via their credit score) if they are to be granted an installment receivable.

The *customer concentration* is another factor that affects the quality of receivables. If a lot of receivables maintained by the company are from new (or otherwise deemed untrustworthy) customers, ie. low customer concentration, then this deprecates the quality of those receivables - equally, if one single company represents more than 10% of accounts receivable, then your customer concentration is too high, which is equally as risky (ie. large drop in revenue if they stop buying from you).

ALLOWANCE: *Some amount of money put away to fund any uncollected debt. This is generally allocated from experience - if the company knows that 1.5% of credit ends up as bad debt, and it maintains $100,000 in accounts receivable, then $1500 will be kept as an allowance. This allowance might need to be "topped up" regularly as a tax-deductible expense.*

1.1.2   Day's Sales in Receivables

The *liquidity* of a receivable is the number of days' sales in receivables - basically, the duration for which sales remain receivable. This helps to identify the turnover of receivables - a shorter duration as a receivable indicates a higher turnover. The formula for this is:

$$DSR = \frac{(\text{Gross Receivables} = \text{Note Receivables} + \text{Trade Receivables})}{\text{Net Sales} \div 365}$$

This ratio should be equal to the collection duration specified in the company's collection terms - if it's higher, then this indicates a problem of collecting debts. The ratio also reflects on the end-of-year status of a company's receivables; however, as companies tend not to end their business year during peak sales, using the natural business year (a business year ending on a yearly low point in sales) can understate the result, meaning the company might overestimate its own liquidity. Hence, it's important to take an average of a business' data over several years, and also to compare its results to similar companies within its industry. Using longer, more liberal collection durations is more risky, and the unpredictability of noncollectable accounts will always pose a problem.

Using the DSR ratio can be misleading if the firm has highly seasonally-variable sales, combined with the natural business year (such as a company producing Christmas merchandise). Otherwise, the DSR may be overestimated if a large amount of receivables are installments (which would actually indicate trust

and security in the customers, assuming valid auditing) or if the amount of sales grows toward the end of the year (meaning collection would be in the next business year). It might also be understated if the opposite scenario occurs, if the company does a lot of sales with physical cash, or if the company maintains a **factoring arrangement**.

1.1.3   Accounts Receivable Turnover

This also indicates the liquidity of receivables a company maintains, and can be found using:

$$\frac{\text{Net Sale}}{\text{Average Gross Receivables}}$$

FACTORING ARRANGEMENT: *Some amount of receivables are sold to another party at a discount (in order to meet immediate cash requirements), which would deflate the amount of receivables the company maintains at any given time.*

Where the *average gross receivables* is an average of the company's current receivables at the end of the year and the beginning, and perhaps at some intervals in between. This helps to eliminate oddities caused by seasonal variations in business, or if you compare two companies using different business years. The average may be based on quarterly, monthly or even weekly data depending on whether you're doing external or internal analysis (respectively).

This ratio may be converted to an equivalent quantity expressed in days by calculating 365 divided by the Accounts Receivable Turnover.

1.2   Inventory

See my Financial Management notes for more info on inventory.

Perpetual record of inventory should be maintained. A continuous record of current inventory, as well as amount of goods sold/bought, is taken. These running records are verified by a physical tally-up at least once per year. Periodically, physical inventories are kept track of by noting that the cost of sold goods is equal to the cost of any sold goods, minus the value of the inventory at the end of the business year. Having the right amount of inventory at any given time is important. If the amount of inventory is too high, you end up paying a lot for storage and handling, insurance, compensating for obsolescence, and compensation for theft. However, if you have too little inventory, you lose both sales and customer good-will, not to mention the slowdown due to inefficient production and inability to take advantage of instantaneous opportunities. Plus, you might also end up paying more in administration and ordering costs if you don't order as much in bulk.

The valuation of inventory can be problematic as it depends in which order inventory is used up. *Specific Identification* uses specific cost to find out the ending inventory cost (ie. the inventory in stock at the end of the business year). This is done by literally counting the inventory that comes in and out, and literally multiplying that by the cost per unit to get a net cost for the inventory. However, as this is prone to manipulation by management to make more money for the department.

An alternate way of management is by making certain assumptions on the cost flow of the inventory. It depends on how the inventory is shifted - last-in, first-out or first-in, first-out. For the FIFO assumption, the first goods acquired are the first sold - the main cost of the inventory is accounted for by the oldest inventory. Because of this, the current cost of maintaining inventory is not well matched against the current revenue, and can also inflate profit during economic inflation which understates inventory costs. In a LIFO assumption however, the cost of the most recently-acquired goods is matched against the current sales revenue (as they have only just been purchased) and so current profit is realistic and not dependent on the past behaviour. This means ending inventory is the oldest stock and so inventory valuation can be based on years- or decades-old stock - at the expense of causing degradation/obsolescence of the old stock. To calculate the cost of goods sold amount using LIFO or FIFO, just look at the amount of goods sold and work out (either from the beginning of the purchase history, or from the end) the cost of the n items that were sold. Here is an example stock listing:

	Quantity	Date	Cost per.	Total
	120	September	$70	$8400
	80	December	$90	$7200
	50	January	$105	$5250
	75	April	$120	$9000
Total	325	-	-	$29850

The *averaging method* results in an inventory amount, and a cost-of-goods-sold amount, somewhere in-between FIFO and LIFO. This is done by first getting the average value per item *as purchased* and then multiplying by the count that were purchased.

The resulting inventory amount won't match the cost of replacing the sold inventory, so the inventory must be sold for a greater amount than was paid for to turn a profit - this means the short-term debt paying ability of the company is understated. This understatement is reduced by reporting the operating expenses, to calculate the *net income* which accounts for the missing overhead.

The reported profit using FIFO is generally higher than when using LIFO (as using LIFO means you have sold more expensive goods at the same price, assuming some inflation), but LIFO better reflects the current instantaneous cost of sales. The *LIFO reserve* is the delta between the FIFO and LIFO inventory value, which will typically be positive.

For example, to calculate the cost of goods sold for 150 items using the different methods:

FIFO Pick the first 150 that were sold - 120 from September and 30 from December. $120 \times 70 + 30 \times 90 = 11100$.

LIFO Pick the last 150 sold - 75 from April, 50 from January and 25 from December. $75 \times 120 + 50 \times 105 + 25 \times 90 = 16500$. Here you can understand why LIFO causes a lower reported profit (due to a higher initial cost of the sold items).

Averaged Average cost per item: $\frac{29850}{325} \approx 91.85$. Cost for 150 = $91.85 \times 150 = 13776.92$, somewhere in-between the above two.

The *lower-of-cost-or-market* rule is one last thing to bear in mind when tallying up inventory. Cost flow assumptions might otherwise use historical data of the price paid for the inventory; however, this is less useful when trying to calculate the replacement cost of the asset if the cost of the assets has since changed. Hence, the LCM rule states that if the current market value of an asset is below its historical cost, the inventory must be written down to account for the diminished utility value. However, with this rule, inventory value can be written down, but *not* up.

1.2.1   Liquidity of Inventory

The liquidity of inventory is calculated in much the same way as it is for account receivables - and it represents the number of days that stock remains in inventory for (assuming FIFO). For example, the *day's sale in inventory* is calculated as:

$$\frac{\text{Ending Inventory}}{\text{Cost of Goods Sold} \div 365}$$

This is a general indicator to the length of time required to sell the entire current stock of inventory. The same caveats apply to this ratio as do to the liquidity of receivables (with regard to the natural business year and differing seasonal throughput), but generally, the lower the value of this ratio, the better the control over the inventory is by the company. Too low however, indicates a shortage of inventory and thus lost sales, while too long of a duration indicates an excess of inventory for the current amount of sales being made. Another caveat to this ratio is that it uses the ending inventory of last year, so the data is slightly out of date.

The *inventory turnover* is calculated as (cost of goods sold) ÷ (average inventory), where *average inventory* is some quarterly/monthly/weekly average of the inventory levels - again, depending on the analysis being external or internal, respectively.

Again, it's unfair to compare companies using a mix of business years, and these ratios may be distorted if the stock is turned over in a more LIFO-style way than a FIFO style. The average inventory turnover, in days, is calculated as:

$$\frac{\text{Average Inventory}}{\text{Cost of Goods Sold} \div 365}$$

And the turnover of inventory, per year, is 365 divided by this value. Finally, using both (a suitable value for) accounts receivable turnover, added to the inventory turnover (both in days), you can get a valid estimate for the duration of the operating cash cycle. This duration is subject to the compound distortion of both durations, especially due to the use of a LIFO-style inventory and seasonal discrepancies.

Finally, other types of current assets include prepayments (debts paid for earlier than expected, reducing the interest from the expected value) which will typically be consumed within one OCC. This can be valuated simply from the carrying cost of the prepayment, and the concept of liquidity doesn't apply as it has (by definition) already been paid for. Other negligible current assets include things like property being held for sale/rent, and any advances or deposits on services offered by external organisations - both of which may slightly distort any calculated liquidity from inventory and accounts receivable.

1.3   Current Liabilities

Current liabilities are markedly easier to deal with than current assets, as there is no unpredictable external factors that may affect the ability of the firm to collect cash. Current liabilities include obligations of the company which require either the consumption of current assets, or creation of other current liabilities, to satisfy - these include accounts/notes payable, wages and taxes, and the currently-expected portions of long-term liabilities. Liquidity does not apply to liabilities as the company is in complete control of them, and the difference between the current and face value is irrelevant.

To compare current assets and liabilities, there are several ratios and deltas that may be applied. These all indicate the short-term debt paying ability of the company, and these include:

Calculation of working capital. This is just (current assets) − (current liabilities) which indicates the immediate solvency of the company. It may be understated depending on the way inventory is moved through the company (a LIFO style inventory will result in an understated working capital), and because the working capital retains no information on the scale of the current assets and liabilities, any comparison between different companies is worthless - small company A could have the same working capital as multinational company B if B is currently riddled with debt.

Current ratio. This is just the ratio between the current assets and the current liabilities - this is better for comparing between different companies, as it essentially compares the working capital of the company against the scale of the company's operations. Traditionally, this ratio should be around 2. A decreased ratio indicates low liquidity.

Cash ratio. This is calculated as (cash equivalents + marketable securities) ÷ (current liabilities), and is extremely conservative - companies can't be expected to maintain physical cash (or equivalently redeemable) such to the extent of being able to pay off all current liabilities. It being too high would imply the company was not moving at all and not using its cash reserves to its advantage. Still, if it's too low, companies will struggle just to pay the bills.

Acid-test ratios. These are just additional ratios to get some info on different aspects of the company: (current assets − current inventory) ÷ (current liability) which relates the most liquid assets within the company to its current liabilities, which may differ significantly from the current ratio for a business with an incredibly slow or aging inventory (such as wine). Thus, this is good for measuring the immediate liquidity of the firm.

Finally, one other thing to consider is the ratio of a company's sales to its working capital. This measures the turnover of capital per year (possibly as an average) and should be compared to historical data (to itself, to the average for the industry, and to competitor's data) to determine whether a firm isn't effectively capitalising on its gains, or if it is using its working capital in a counterproductive way.

2   Long-term Debt

There are two approaches to determine the long-term debt-paying ability of a company.

Look at the income statement of the company. This will allow you to determine the profitability (from tax expenses, net income/loss, revenue, etc.)

Look at the balance sheet of the company. The balance between income and expenditure of a company can also provide some valuable income into the debt-paying ability of a company.

2.1   Income Statement

2.1.1   Times Interest Earned

One measure uses *times interest earned*, and is a measure of a company's ability to pay off debts. It is calculated as

(recurring earnings + tax expense + equity earnings + other earnings)/(interest expense incl. capitalised interest)

$$\frac{(\text{recurring earnings}) + (\text{tax expense}) + (\text{equity earnings}) + (\text{other earnings})}{\text{interest expense including capitalised interest}}$$

Meaning it essentially covers how many times over a company can pay interest charges. A good track record for this ratio indicates a good history of having the long-term ability to pay off debts, finance a high proportion of its own debt, and thus obtain more favourable interest rates. This ratio should consider only regularly-occurring sources of income, and exclude irregular sources such as interest expense and income tax expense. Ideally this should be computed over a period of three to five years, and the lowest value taken. For a shorter coverage run, the following equation may be more useful (note the exclusion of interest/tax/equity expense):

$$\frac{(\text{recurring earnings}) + (\text{non-cash expense})}{\text{interest expense including capitalised interest}}$$

2.1.2   Fixed-charge Coverage

The ratio is the same as the *times interest earned* but both the numerator and the denominator have the *interest portion of rentals* added. The ratio should usually be similar to the times-interest earned, at least with respect to how it changes. The ratio measures the firm's ability to cover fixed charges. A *fixed charge* is essentially a mortgage taken out on an asset (eg. bit of land) the company already owns, as a collateral to a loan. The asset in question cannot be disposed of or sold until the debt is discharged, and it must be maintained in such a way that its value does not depreciate - fixed charges are first priority when liquidation occurs, so the creditor may sell the asset to meet any owed debts should the debtor default. Contrast this with a *floating charge* which is generally all of a firm's assets, with which the firm can trade with normally, unless the firm defaults on the terms of the loan, in which case the floating charge "crystallises" (cannot be changed) and the lender is then entitled to the assets covered by the charge at the moment of crystallisation.

There are several types of borrowings: a *term loan* which is a standard non-transferrable loan with fixed repayment terms and rates of interest, under a contract. Also available are *loan notes/bonds*, where "units" of debt are offered for sale to investors. These loan notes may be publically traded, and thei value fluctuating with interest rates. The "coupon rate" is the face value of the bond.

A company is entitled to borrow money to further the business. In this scenario, a company may use its own assets to secure the contract of the loan - this is called *debenture*, a written acknowledgement of the security of the loan, containing provisions of both the payment of the capital of the loan, and the payment of (and frequency of) interest on the loan. Debentures are secured by charges giving the holder a claim (over other creditors) to payment of the debt out of the assets of the company. The assets can be tangible or intangible, and can be fixed or floating as specified earlier.

When calculating fixed-charge coverage, the definition of a fixed charge can be debateable. If it includes capital/operating leases, or includes more things like pension payments, depreciation, amortization (payment on the non-interest component of a loan), then the ratio becomes more conservative.

2.2   Balance Sheet

The balance sheet exposes some more internal data about the workings of the company.

2.2.1 Debt Ratios

The *debt ratio* is a way of determining long-term debt repayment ability by looking further than just the externally declared incomes. It is calculated by

$$\frac{\text{total liabilities}}{\text{total assets}}$$

where *total liabilities* includes all liabilities including both short-term current and non-current liabilities, deferred tax liabilities and non-controlling interest (insignificant, ie. <50%, ownership stakes in a compo-ration). It indicates the percentage of assets financed by creditors at a given time. For this ratio, the *lower* the better. Whether short-term liabilities should always be included depends on whether they contribute to a long-term source of funds - for example, account payables, but not liabilities that don't necessarily signal intention to pay funds in the future, for example reserves and NCIs.

Reserves are generally classified as liabilities in the broadest sense of the term. A reserve is money set aside to pay for something (eg. purchase fixed assets, pay off debt, etc.) so it generally matches an expense, but not a liability, as they are just an estimate of the funds that will be paid out (or at least an upper bound). In countries like Germany they are included for a conservative estimate but not in countries like the US.

Deferred income tax is the difference between the income tax expense, and the income tax payable - ie. a liability due to earned income being recognised for accounting purposes, but not for tax purposes. This is more of an issue in the US this time.

Minority Shareholder's Interest (non-controlling interest) appears on the balance sheet as stockholder's equity, and while is not a liability, is included in the ratio if you need a conservative measure.

2.2.2 Types of Share

Ordinary - carry most voting rights

Preference - these entitle the holder to a fixed dividend and are prioritised over ordinary shares

Redeemable - short-term, bought back within a short lifespan. May be ordinary or preference

Deferred/founder - increased voting rights, but lower priority than ordinary for the return of capital. These give the founder of the company (for example, Bill Gates from Microsoft) some additional direction and control over the company, even after leaving

The *debt-equity* ratio is another measure of long term debt repayment ability. It is equal to

$$\frac{\text{total liabilities}}{(\text{total assets}) - (\text{total liabilities}) = (\text{shareholder's equity})}$$

The lower this ratio, the better - this ratio determines the protection of creditors in the case of insolvency of the company.

A similar ratio is the *debt to tangible net-worth* ratio - this is

$$\frac{\text{total liabilities}}{((\text{shareholder's equity}) - (\text{total liabilities})}$$

and is more conservative than the simple debt-to-equity ratio as it discounts assets which are not easily convertible to cash, so this only takes into account assets with a good book value.

2.2.3 Other Ratios

Debt-to-net-worth relationship between liabilities and funds contributed by shareholders. Greater risks with more current liabilities

Total capitalisation long-term debt to total capitalisation, where *total capitalisation* is long-term debt, preferred stock and stockholder's equity combined. The lower this ratio, the better, as it indicates that the equity of the company outweighs its debts.

Fixed asset to equity the extent to which shareholders have provided funds in relation to fixed assets.

2.2.4   Non-ratio indicators of debt-paying ability

Finally, things the company offers to employees (such as pension plans, or other post-employment or post-retirement benefits) or things like joint ventures with other companies.

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