

Three Analytic Tools

Three relatively simple, but powerful analytic tools are:

Du Pont Analysis

Sustainable Growth Rate

Break Even

They are so useful, we have included Excel spreadsheets of them on this webpage.

Since most of the inputs into Sustainable Growth Rate are also used in Du Pont Analysis, these two tools have been combined in the one spreadsheet. The Break Even spreadsheet requires separation of costs into fixed and variable and so is provided on a separate spreadsheet.

Uses

Du Pont Analysis

Du Pont Analysis is the basis of most consultants' analytical frameworks. It maps out (and puts numbers on) all the components that make up the key ratio in most businesses: Return on Investment (ROI).

It allows us to see what changes need to be made to achieve a desired return. Alternatively, it can highlight where the key problems are for achieving good returns. We can then focus on addressing these problems.

Sustainable Growth Rate

Sustainable Growth Rate is a quick and neat calculation to see if we are growing within our means. Given our levels of profitability, dividends paid out, assets required and debt levels, how fast can we grow our sales without running into financial difficulty.

While we are usually keen to grow sales, too much growth puts strains on our ability to fund it. This is known as **overtrading** and is one of the key causes of business failure. Profitable companies go bust: it is cash flow that pays the bills, not profit.

The professional manager needs to balance profits, growth and viability.

Break Even

This applies to all companies and projects: big and small.

Before we launch a new product or enter a new market or put in some new equipment, the key question is what level of activity do we need to achieve to cover our costs: i.e. break even.

There have been many projects launched which need 300% market share to break even!

The Excel spreadsheet even allows you to calculate the break even for your entire business, even if it has multiple products or services. You just need to input the sales mix into the spreadsheet.

Reality

The tools are a handy **first approximation** of analysis for your business. Naturally, there should be some fine tuning to be more exact. As well, you then need to understand the analysis and what to do about it.

Even so, you will gain some interesting insight into your business from these tools and their spreadsheets.

Some additional notes about Du Pont Analysis, Sustainable Growth Rate and Break Even are provided below.

1. DU PONT ANALYSIS

1.1 Du Pont Analysis

Du Pont analysis was developed by the Du Pont chemical company. It is a simple but powerful analytic tool for improving an organisation's performance.

In its very basic form, it looks at return on investment (ROI). In most cases, this is defined as profit / assets. Return on Capital Employed (ROCE) is much the same concept. It is expressed as a percentage. So if the profits are \$2 million per annum and the assets invested in the business are \$10 million then the ROI is:

$$\text{\$2 million} / \text{\$10 million} = 20\%$$

ROI or ROACE is a key performance indicator. Managers and investors alike concentrate on it.

But it is merely descriptive. It does not tell you how to achieve a "good ROI" or how to improve ROI.

This is where Du Pont analysis helps. It breaks down ROI into its component parts:

$$\text{ROI} = \frac{\text{Profit}}{\text{Assets}} = \frac{\text{Profit}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}}$$

Profit / Sales is the *sales margin*. This is what percentage profit is made on each dollar of sales. If profit is \$2 million and sales are \$20 million, then the sales margin is:

$$\text{\$2 million} / \text{\$20 million} = 10\%$$

Sales / Assets is the *asset turnover* ratio. It measures how much sales can be serviced by each dollar of assets. If sales are \$20 million and assets are \$10 million then the asset turnover is:

$$\text{\$20 million} / \text{\$10 million} = 2$$

Sales margin times asset turnover equals return on assets. In our example, it is 10% x 2 = 20%.

1.2 Improving ROI

This still does not show how to improve ROI but it is more informative.

Any actions that improve the sales margin will improve the ROI.

Likewise, any actions that improve the asset turnover ratio will improve the ROI.

1.2.1 Improving Sales Margin

In general terms, there are only two ways to improve the sales margin:

1. Raise prices
2. Lower costs

1.2.2 Improving Asset Turnover

In general terms, there are only two ways to improve asset turnover:

3. Sell more
4. Use less assets

In the sell more method, we need to increase sales by a greater percentage than the assets increase. In the use less assets method, assets must be reduced by a greater percentage than sales fall. If you reduce the assets wisely, sales may not fall at all or may even rise!

So the four ways to improve ROI are:

1. Raise prices
2. Lower costs
3. Sell more
4. Use less assets

Typically, management has concentrated on just one of these four methods: lower costs. This generally means reducing the number of employees.

But Du Pont analysis reminds us that there are three other methods that are equally important. Some managers are finally awakening to this fact.

1.3 How to Do It

This is the difficult part. So far, the analysis is still mostly descriptive.

It now requires detailed information about a business's operations in order to come up with feasible actions to raise prices, lower costs, sell more or reduce assets.

Some possible actions might be:

- changing the product mix
- more effective marketing (perhaps telemarketing)
- product rationalisation
- sale and lease back of assets
- lower overheads
- cheaper sources of finance
- more productive staff (e.g. multi skilling)

1.4 Detailed Du Pont Analysis

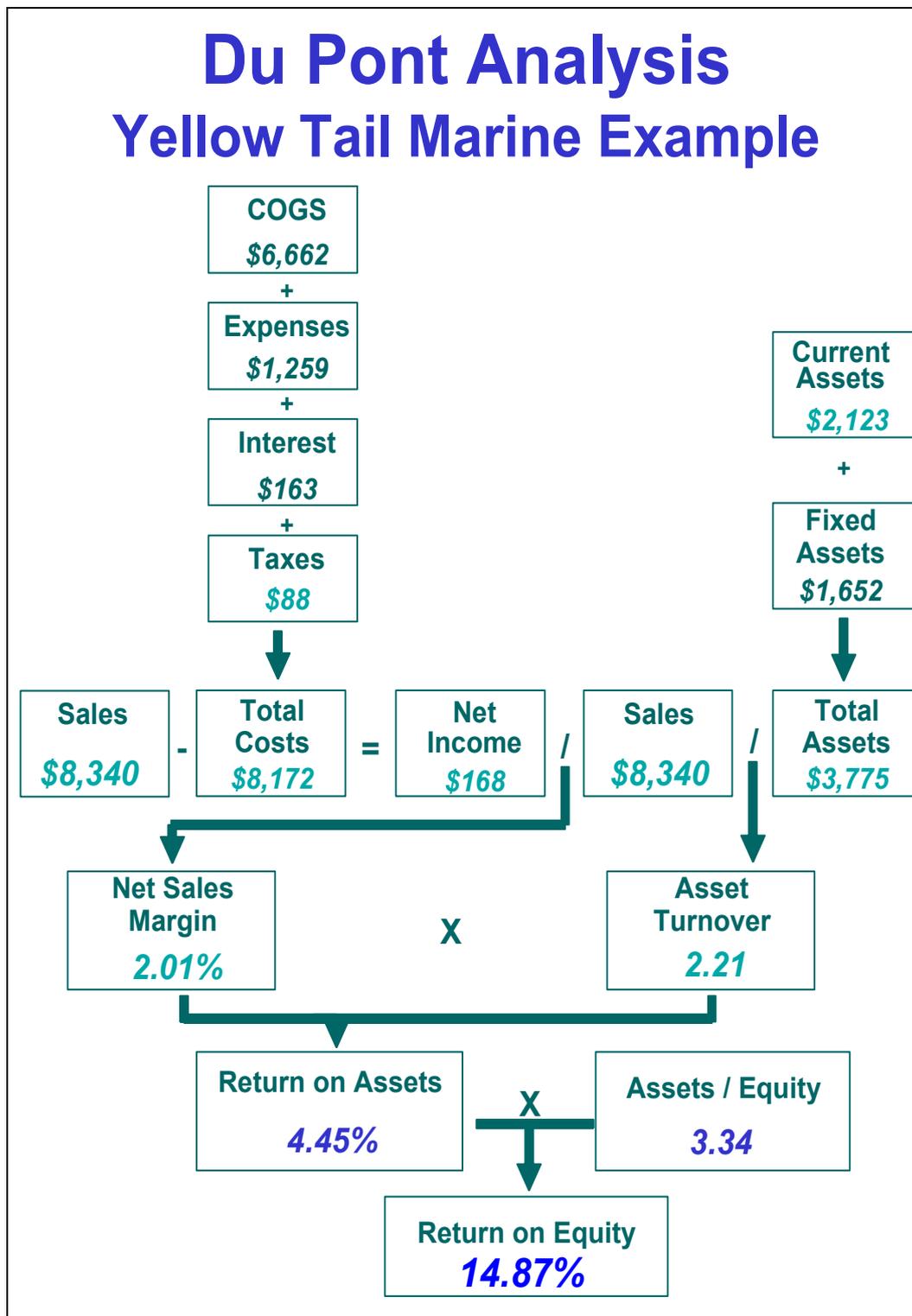
Du Pont analysis goes beyond just the asset turnover ratio and sales margin. It details the various costs and assets that make up the business. This is usually put on a large chart or in a spreadsheet.

It also quantifies the analysis. Actual numbers are put in for the sales, costs, different assets and so on. From this the ROI is calculated. (We can even go further and include gearing and then calculate return on equity).

Then any changes made to assets, prices, costs and so on are adjusted on the chart. The new ROI is then calculated.

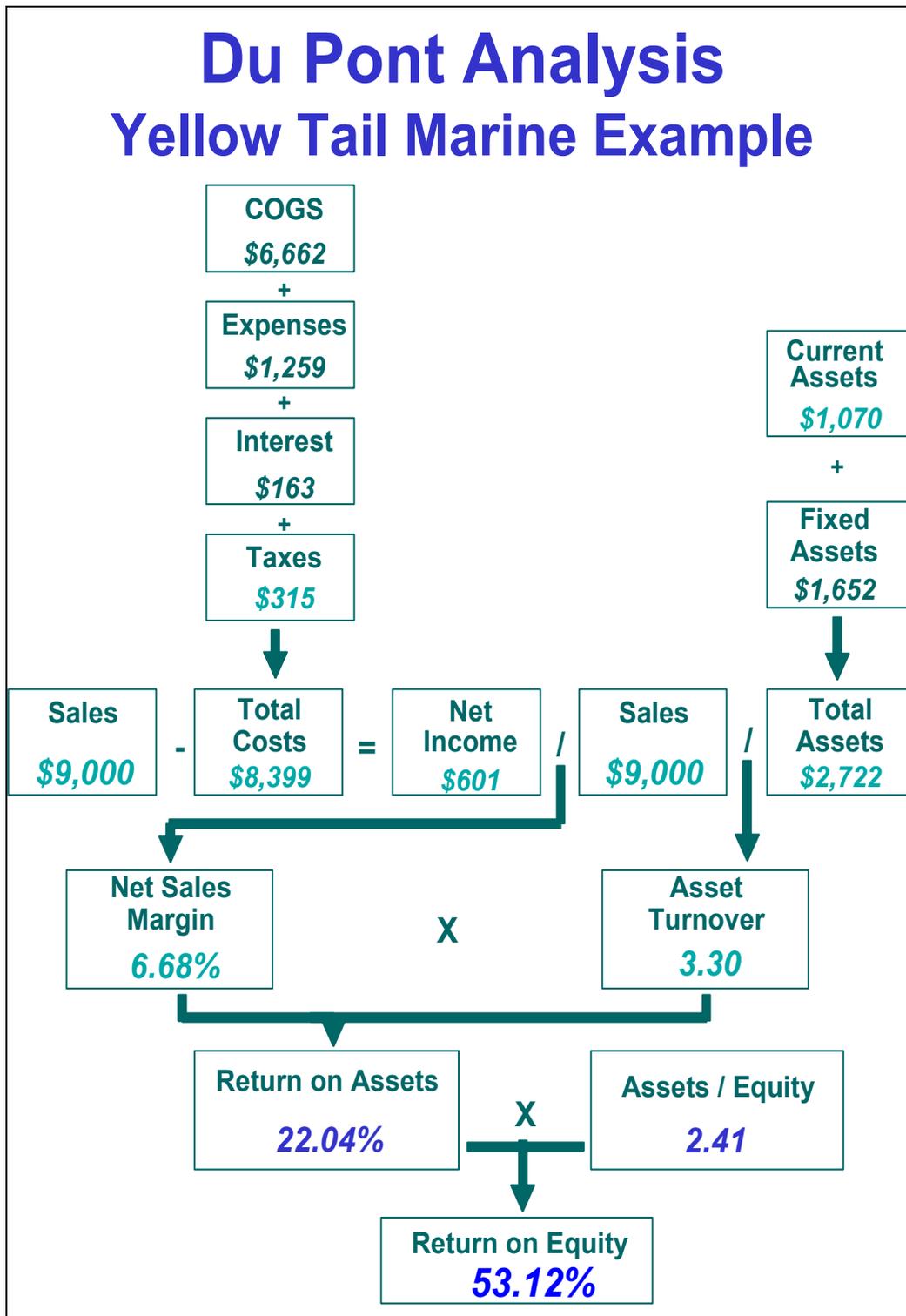
Simple Du Pont charts are attached. In reality, they would be more detailed. For example, current assets would be broken down into debtors, stock and other assets.

Yellow Tail Marine made leisure boats – from little 14 foot runabouts to 50 foot cruisers.



The analysis shows that asset turnover ratio is good at \$3.34 of sales for every dollar of assets. However, the sales margin is way too thin at just 2% (that is supermarket level). So the first focus will be on margins: raising prices or cutting costs.

The new manager basically did two major changes. First, put the prices up on the big boats by 50% with some extra marketing of benefits to clients. Second, reduced the work in progress stock of the small boats: Now these boats were made to order from blanks and the pressure was on to fill orders quickly. The corresponding changes are made to sales and current assets and the new Du Pont chart is shown below.



2. SUSTAINABLE GROWTH RATE

How Fast Can a Company Grow Its Sales?

A prime cause of companies going bankrupt is **overtrading**. This is growing sales faster than the company can support. The company is "profitable" but does not have the cash to fund the required asset growth.

How fast a company can grow is determined by several factors:

1. Profit Levels

The higher the profit margin on sales, the more funding available to a firm from its sales (i.e. retained earnings grow quickly as sales grow). Measured by *Profit / Sales*

2. Dividends

However, profits are "leaked" out of the company by dividends. The higher the dividend payout ratio, the lower the possible sales growth. Dividend payout ratio is *Dividends / Profit*

3. Required Assets

If a firm needs a large amount of assets to support a given level of sales, then its ability to grow is restricted. For example, if every dollar of extra sales needs more machinery, accounts receivable, inventory, etc, then funding the extra sales is a major strain on cash. Service industries usually are the best placed for low asset requirements for extra sales. Measured by asset turnover: *Sales / Assets*

4. Gearing

The equity to assets ratio will show how much extra can be borrowed as retained earnings are increased. Measured by *Equity / Assets*

Sustainable Growth Rate

The sustainable growth rate is a calculation to show how much sales can grow each year without causing strain. If the company tries to grow faster, something must give. Either more equity must be put in by the owners or gearing will increase. If the banks refuse more loans,

the extra "borrowings" usually come from trade creditors (the company simply cannot afford to pay creditors on time).

Note that the extra funding is only for the increase in sales in any one year.

Sustainable Growth Formula

The percentage increase in sales that a company can fund can be determined by an equation. The components of the sustainable growth (SG) equation are simply the factors listed earlier:

Return on Assets (ROA)

This ratio measures both the after tax profit margin on sales and the amount of assets required to service sales. It is profit after tax divided by assets.

Amount of Profits Retained

How much profits is retained after paying dividends is found by multiplying the Return on Assets by (1-D) where D is dividend payout ratio.

Gearing

The amount of extra borrowing that can be supported as retained earnings increase equity is found by the gearing ratio of equity divided by assets (E/A).

So the equation is:

$$SG = \frac{ROA \times (1-D)}{E/A - (ROA) \times (1-D)}$$

The answer is the **percentage growth in sales** by which sales can grow without increasing gearing levels or issuing more equity.

This equation is not perfectly accurate but it is close enough.

Example of Just Jeans in 2000

Just Jeans was a leveraged buy out of the public company. It was very highly geared (plenty of debt) and the banks were nervous. Would there be enough cash flow to service the debt. If the company grew too fast, all the spare cash flow would go on shop fit outs and more stock rather than paying the interest and paying off the principal of the loan.

A quick check is to use the sustainable growth rate formula. Dividends were set at maximum of 30% of profits.

Assets were \$101.6m. Sales were \$345m. Equity was \$50.4m. Profit after tax was \$8.0m. We will assume that 70% of profits are paid out as dividends.

Asset turnover is sales / assets = 3.40 times

Sales margin is profit / sales = 2.32%

So ROA = 3.4 x 2.32% = 7.89% (or profit / assets = 11.%)

Equity / Assets = 0.496

(1-D) = 0.30

$$\begin{aligned} \text{SG} &= \frac{0.0789 \times 0.3}{0.496 - 0.0789 \times 0.3} \\ &= 5.0\% \end{aligned}$$

Note: in 2001, profits were over \$30 million which allows a much greater sales growth.

So, on the 2000 figures, the company can sustain a sales growth rate of 5.0%. Any faster growth than 5.0% would require some change in the above parameters e.g. profitability, asset turnover, gearing or dividend payout ratio.

The company planned to keep sales growth in 2000 at less than 5% and only grow it slightly in 2001 when the sustainable growth rate was higher. So the loans look viable.

3. BREAK EVEN

Contribution Analysis

Contribution analysis is a method of determining the break even point: how many sales are needed just to break even i.e. no longer make a loss. It is also known as marginal analysis, variable costing and contribution margin analysis.

This is a very simple but very powerful tool. It is “back of the envelope” stuff but is a very useful “first screen” to see if the project is worthwhile before conducting more extensive and more expensive detailed analysis.

It is also a particularly useful tool for start up projects. In such cases, there is no detailed history on which to conduct ratio or some other analysis. The breakeven analysis, allied with some market analysis and common sense can help determine if the project can be viable.

Examples would include launching into a new market or with a new product or opening a hotel or golf course or starting a restaurant. It can apply anywhere.

The basics of break even analysis lie in understanding the fixed and variable costs of the project or business.

All businesses have some *fixed costs*. These are costs that are borne whether there are any sales or not. Examples may include rent, salaries, interest on loans and so on.

For an airline flight, the fixed costs would be most of the fuel, depreciation on the plane (or leasing costs), maintenance, landing fees, the crew and so on.

The other costs in a business are *variable costs*. These increase as sales increase. Examples may include raw materials, packaging and so on.

For an airline flight, variable costs include a little of the extra fuel (if we have more passengers or cargo), maybe some meals, some toiletry kits and some drinks.

In real life it can be quite complex to split costs between fixed and variable. However, it is a worthwhile exercise if you want to make logical management decisions.

For our airline flight, nearly all the costs are fixed. This means that the flight is VERY volume sensitive. When Qantas first floated, its profit forecasts were based a 76% seating utilisation (i.e. 76% of all seats would have a paying passenger in them). If the seating utilisation rose by 2% to 78%, then profit doubled. On the other hand, if seating utilisation fell 2% to 74%, then profit was wiped out.

This is why Qantas no longer hangs on to poor routes in the hope it will improve. Code share it or drop it fast! It also explains why Qantas is having its best ever period for profits. Planes are full and ticket prices are rising.

Break Even

The break even point is one of the most fundamental pieces of information we need to know in business. For any project or even for the whole company, how many units do we need to sell just to cover all our costs?

To calculate break even, we need to split our costs into **fixed costs** and **variable costs**.

Fixed costs do not change when we change the volume of sales – we have to pay them anyway. Examples would be rent or interest or salaries.

Variable costs are directly linked to the sales volume. The more you sell, the more variable costs you have. Examples would be raw materials, packaging or sales commissions.

The break even point is calculated using fixed and variable costs and the **contribution margin** per unit of sale.

Every time we can make a sale, we get money into the business. But to make a sale it costs us for the variable costs: the raw materials, fuel and so on.

What we have left over after making each sale and paying for the variable costs is the **contribution margin** per sale. We give it the symbol “m”

The contribution margin is not profit yet because we have not paid for the fixed costs. So it is contribution towards paying for the fixed costs. The fixed costs are **NOT** broken down to a per sale cost. They are a big lump that must be paid each month or year or whatever - regardless of how many sales are made.

After the fixed costs have been covered - the break even point - any additional sales will make contribution to profit.

The break even equation is: fixed costs / contribution margin per unit.

If our sales unit was tickets or beds or widgets, then the break even is in those units. If our unit of sale was per dollar, then the break even is in dollars. Likewise with the time period. If we used fixed costs per month, then the break even result is in sales units per month. If we used annual fixed costs, then the break even result is in sales units per annum.

Example

We have a shop that has fixed costs per month of \$20,000 (for rent, salaries, power, advertising, etc). For every dollar of sales, it costs 75 cents for variable costs (for goods purchased for resale and a little gift wrapping).

So how many sales (in dollars) does the shop need each month just to break even?

The contribution margin on each dollar of sales is 25 cents (\$1.00 of sales minus \$0.75 cents of variable costs).

The break even point is: $\$20,000 / \$0.25 = \$80,000$ per month

The shop needs to sell \$80,000 of goods each month just to break even. The break even is a monthly figure because our fixed costs were per month. If we used annual fixed costs then the break even point would be how many sales per annum. If we use fixed costs per plane flight, then it is how many passengers per flight.

Break Even With Multiple Products

The break even examples above were actually quite simple. There was basically only one product category. Therefore, the break even calculation was whether there were enough sales of that product to cover the fixed costs: bunches of flowers, bottles of wine or passengers.

Unfortunately, real life is usually more complex. There are multiple products and they share some or all of the fixed costs.

This can lead to very complex cost allocation problems. Activity Based Costing and transfer pricing can be very complex issues involved in allocating costs.

For conducting break even with multiple products, the process can still be very simple as long as we do not have to worry about trying to allocate fixed costs or overheads to actual products in great detail.

Even so, we need to simplify the situation. Imagine conducting a break even analysis for a supermarket with thousands of different products. Typically, we simplify the vast product range down to a few product categories – groupings of products with similar characteristics. The unit of sale can no longer be bunches of flowers and so on. The common unit now is dollars. We express the sales price, variable costs and contribution margin in dollar of sales. The fixed costs remain a lump of dollars per time period.

Example of a Liquor Store

We have a local liquor store. For simplicity, we assume that there are three major product categories: 1. beer; 2. wine & spirits; 3. other (cigarettes, chips, etc). The fixed costs are \$15,000 per month (wages, depreciation, advertising, interest, etc).

We now calculate the contribution margin for this store. The variable costs are basically the purchase cost of the items. We also allow some variable electricity for the cold room for the beer.

Note that we still need to understand how costs operate. For example, in most places, there is a liquor retail tax or licensing fee. If this fee is calculated on dollar turnover or per bottle then it is a variable cost. If it is a flat monthly or annual fee, then it is a fixed cost. Excise on alcohol content would be more difficult.

<u>Product</u>	<u>Beer</u>	<u>Wine & Spirits</u>	<u>Other</u>
Price	\$1.00	\$1.00	\$1.00
Variable Costs	<u>\$0.92</u>	<u>\$0.65</u>	<u>\$0.50</u>
Contribution Margin	\$0.08	\$0.35	\$0.50

So what is the break even sales per month?

Unlike our previous examples, we cannot calculate the break even point in dollars of sales from the above information. We need one additional piece of information.

We need to know the product mix. What proportion of the sales are beer, wine & spirits and other. Once we know that we can calculate the break even.

We use the product mix to calculate the weighted average contribution margin. We multiply the variable costs and the contribution margin by the weighting of sales shown by the product mix.

<u>Product</u>	<u>Beer</u>	<u>Wine & Spirits</u>	<u>Other</u>	<u>Weighted Average</u>
Price	\$1.00	\$1.00	\$1.00	\$1.00
Variable Costs	<u>\$0.92</u>	<u>\$0.65</u>	<u>\$0.60</u>	<u>\$0.85</u>
Contribution Margin	\$0.08	\$0.35	\$0.40	\$0.15
Product Mix	75%	20%	5%	

In doing the weighting, we took 75% of the variable costs for beer (69cents), plus 20% for wine & spirits (13 cents), plus 5% for other (3 cents) to give a weighted average 85 cents variable cost. We do the same for the contribution margin to find a weighted average contribution margin of 15 cents per dollar of sales.

The break even point is now found by the simple equation of fixed costs divided by contribution margin. In this case it is \$15,000 divided by \$0.15 = \$100,000 per month or \$1.2 million per year.

Unless our liquor store can turn over this much in sales, we will be making a loss.

What if we want to make \$5,000 per month profit instead of just breaking even. What dollar volume of sales is needed now? Well, treat the profit like another fixed cost to be covered.

The equation is now $\$20,000 / \0.15 which is about \$133,335 per month of sales or \$1.6 million per annum.

Finally you should note that we now have an additional factor to use in running the business and improving profit. We not only have the fixed and variable costs to control or the sales price or the volume. The additional factor is the product mix.

How can changing the product mix affect the profits?

If feasible, what is the best product line to promote? “Would you like fries with that champagne?”