Efficiency and profitability criteria for a geared share portfolio

In a previous article **HUGH O'REILLY** derived, interpreted and demonstrated a model for measuring an equity investment's efficiency and profitability. This article illustrates five practical extensions to this performance model.

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To make rational decisions, investors need valid and reliable information. With so many investors new to margin lending, many do not fully understand the implications of altering their investment parameters. The previous article (JASSA: Issue 2, Winter, 2005) aimed to assist investors in their understanding, and advisers in their explanations, by introducing a model to measure share investment performance.

The model converts the six percentage rates that determine share investment performance into two summary percentage rates measuring efficiency and profitability. The six input variables are: the yield that the shares are providing (y); the franking credit rate of the share company (c); the capital growth rate of the shares (g); the interest rate charged on borrowing (r); the personal tax rate (t); and the proportion borrowed (p). The two output variables are the Cash Flow Rate (CFR): a measure of efficiency, and the Return on Equity (ROE): a measure of profitability.

The model can be summarised by :

$$CFR = (y/c' - rp)t'$$

and

$$ROE = [(y/c' - rp)t' + g]/p'$$

* Note: In the above model, that $c' = 1 - c$, $t' = 1 - t$ and $p' = 1 - p$.

A spreadsheet tool was used to demonstrate the model's ability to monitor variations to an investor's performance. The model and the spreadsheet tool provide advisers with a practical tool to describe the share investment's performance in a format that allows multiple comparative analyses.

This article aims (again) to assist advisers in their explanations to investors, by extending the previous model. Five practical extensions to the performance model are derived, interpreted and demonstrated with the assistance of the spreadsheet tool. The first three extensions are important for the investor that wishes to maintain a positive CFR. The final two extensions are not restricted to this category of investor, but are critical to all investors using margin lending. A free spreadsheet illustrating the original model, as well as the practical extensions below, can be obtained from the author at hugh.oreilly@buseco.monash.edu.au.

MAINTAINING A POSITIVE CFR

The Cash Flow Rate (CFR) illustrates how smoothly an investment runs by monitoring the annual flow of funds to and from the investor. The CFR is a measure of the net effect on the investor's hip pocket of holding an investment. It is an indicator of efficiency. A CFR may be positive or negative. If a CFR is positive then the investment's distributions (dividends) will outweigh the investor's

debt payments after tax. If a CFR is negative then the investor must provide extra cash payments over the year to maintain the investment.

Many investors are not prepared to be 'negatively geared'. They need their investment to be 'self-supporting'. They do not wish to be compelled to find funds to service their investment. A positive CFR would satisfy this need. Though a positive CFR is not necessary for successful investment, risk-averse investors have every right to place such a constraint on their investment.

If a client who is borrowing for an investment in shares wishes to maintain a positive CFR, then he/she should be made aware that there are three constraints: a minimum yield, a maximum interest rate, and a maximum proportion to be borrowed.

From the model	**CFR = (y/c′ – rp)t′**	
Let CFR > 0	**(y/c′ – rp)t′ > 0**	
then	**y > c′rp**	**1a**
also	**r < y/(pc′)**	**1b**
and	**p < y/(rc′)**	**1c**

MINIMUM YIELD NECESSARY TO PROVIDE A POSITIVE CFR

From formula 1a above, the minimum yield necessary in order to maintain a positive CFR is given by the formula **y* > c′rp**.

A demonstration of the above formula follows:

If the franking credit rate is 30%, then c = 0.30 and c′ = 1 – 0.30 = 0.70.

If the interest rate charged on borrowings is 7%, then r = 0.07.

If the proportion borrowed is 40%, then p = 0.40.

So the minimum yield necessary in order to maintain a positive CFR, under the above conditions, is given by

$$\begin{aligned} y^* &> c'rp \\ &> 0.70 \times 0.07 \times 0.40 \\ &> 0.0196 \\ &> 1.96\% \end{aligned}$$

Table 1a (see over), which is taken from the spreadsheet model, illustrates the effect of different interest rates and different borrowing levels on the minimum yield for a positive CFR. With a yield lower than this, the investor will not be able to maintain a positive CFR.

By monitoring the changes in the values of the minimum yield for the different columns and rows of Table 1a, it can be observed that:

- As the interest rate increases, the minimum yield necessary increases;
- As the proportion borrowed increases, the minimum yield necessary also increases.

THE MAXIMUM INTEREST RATE FOR A POSITIVE CFR

From formula 1b above, the maximum interest rate allowable in order to maintain a positive CFR is given by the formula: **r* < y/(pc′)**.

A demonstration of the above formula follows:

If the yield provided by the company is 2%, then y = 0.02.

If the proportion borrowed is 40%, then p = 0.40.

If the franking credit rate is 30%, then c = 0.30 and c′ = 1 – 0.30 = 0.70.

So the maximum interest rate allowable in order to maintain a positive CFR, under the above conditions, is given by

$$\begin{aligned} r^* &< y/(pc') \\ &< 0.02/(0.40 \times 0.70) \\ &< 0.0714 \\ &< 7.14\% \end{aligned}$$

Table 1b (see over), which is taken from the spreadsheet model, illustrates the effect of different yields and different borrowing levels on the maximum interest rate for a positive CFR. With an interest rate higher than this, the investor will not be able to maintain a positive CFR.

By monitoring the changes in the values of the maximum interest rate for the different columns and rows of Table 1b, it can be observed that:

- As the yield increases, the maximum interest rate allowable increases;
- As the proportion increases, the maximum interest rate allowable decreases.

THE MAXIMUM BORROWING PROPORTION FOR A POSITIVE CFR

From formula 1c above, the maximum borrowing proportion possible in order to maintain a positive CFR is given by the formula **p* < y/(rc′)**.

A demonstration of the above formula follows :

If the yield provided by the company is 2%, then y = 0.02.

If the interest rate charged on borrowings is 7%, then r = 0.07.

If the franking credit rate is 30%, then c = 0.30 and c′ = 1 – 0.30 = 0.70.

So the maximum borrowing proportion possible in order to maintain a positive CFR, under the above conditions, is given by

$$\begin{aligned} p^* &< y/(rc') \\ &< 0.02/(0.07 \times 0.70) \\ &< 0.4082 \\ &< 40.82\% \end{aligned}$$

Table 1c (see over), which is taken from the spreadsheet model, illustrates the effect of different interest rates and different levels of borrowing on the maximum borrowing proportion for a positive CFR. With a borrowing proportion greater than this, the investor will not be able to maintain a positive cash flow rate.

By monitoring the changes in the values of the maximum borrowing level for the different columns and rows of Table 1c, it can be observed that:

- As the yield increases, the maximum borrowing level increases;
- As the interest rate increases, the maximum borrowing level decreases;
- For high yields and low interest rates, maintaining a positive CFR is possible for extremely high borrowing proportions. In reality, margin lenders apply their own practical limits as to the percentage of the investment that can be borrowed.

To summarise: If an investor wishes to maintain a positive CFR, then this can NOT be achieved if the yield is less than c′rp, if the interest rate is greater than y/(pc′), or if the

borrowing proportion is greater than y/(rc').

ACHIEVING A HIGHER ROE

Profitability is measured by the Return on Equity (ROE), the percentage return on the investor's own funds. This is the dominant indicator of an investment's efficacy, telling the investor how well the investment is working. The primary reason for adopting margin lending is to improve the investor's ROE. If margin lending were to reduce the investor's ROE then margin lending should not be adopted. Since every client aims to achieve a higher ROE he/she should be made aware that there are two critical constraints: a minimum yield and a maximum interest rate.

From the model
ROE = [(y/c' – rp)t' + g]/p'

Differentiate with respect to p
dR/dp = [–rt'p'+ (y/c' – rp)t' +g]/p'^{2}

Let this differential be greater than zero
–rt'(1 – p) + (y/c' – rp)t' + g > 0

Expand the brackets and simplify
–rt' + yt'/c' + g > 0

Add rt', subtract g and multiply by c'
yt' > c'(rt' – g)

Divide both sides by t' giving
y > c'(r – g/t') **2a**

Now make r the subject giving
r < y/c' + g/t' **2b**

THE MINIMUM YIELD NECESSARY FOR MARGIN LENDING

From formula 2a above, the minimum yield necessary to consider margin lending is given by the formula:
y* > c'(r – g/t').

A demonstration of the above formula follows:
If the average franking credit rate is 30%, then c = 0.30 and c' = 1 – 0.30 = 0.70.
If the interest rate charged on borrowings is 7%, then r = 0.07.
If the average capital growth rate of the shares is 1%, then g = 0.01.
If the personal tax rate is 48.5%, then t = 0.485 and t' = 1 – 0.485 = 0.515.

TABLE 1a: THE MINIMUM YIELD NECESSARY TO PROVIDE A POSITIVE CFR

Enter the franking credit rate	30.00%

Minimum yield		Interest rate						
		4.0%	5.0%	6.0%	7.0%	8.0%	9.0%	10.0%
Borrowed	10%	0.28%	0.35%	0.42%	0.49%	0.56%	0.63%	0.70%
	20%	0.56%	0.70%	0.84%	0.98%	1.12%	1.26%	1.40%
	30%	0.84%	1.05%	1.26%	1.47%	1.68%	1.89%	2.10%
	40%	1.12%	1.40%	1.68%	1.96%	2.24%	2.52%	2.80%
	50%	1.40%	1.75%	2.10%	2.45%	2.80%	3.15%	3.50%
	60%	1.68%	2.10%	2.52%	2.94%	3.36%	3.78%	4.20%
	70%	1.96%	2.45%	2.94%	3.43%	3.92%	4.41%	4.90%
	80%	2.24%	2.80%	3.36%	3.92%	4.48%	5.04%	5.60%
	90%	2.52%	3.15%	3.78%	4.41%	5.04%	5.67%	6.30%
	100%	2.80%	3.50%	4.20%	4.90%	5.60%	6.30%	7.00%

TABLE 1b: THE MAXIMUM INTEREST RATE FOR A POSITIVE CFR

Enter the franking credit rate	30.00%

Maximum interest rate		Yield						
		0.0%	1.0%	2.0%	3.0%	4.0%	5.0%	6.0%
Borrowed	10%	0.00%	14.29%	28.57%	42.86%	57.14%	71.43%	85.71%
	20%	0.00%	7.14%	14.29%	21.43%	28.57%	35.71%	42.86%
	30%	0.00%	4.76%	9.52%	14.29%	19.05%	23.81%	28.57%
	40%	0.00%	3.57%	7.14%	10.71%	14.29%	17.86%	21.43%
	50%	0.00%	2.86%	5.71%	8.57%	11.43%	14.29%	17.14%
	60%	0.00%	2.38%	4.76%	7.14%	9.52%	11.90%	14.29%
	70%	0.00%	2.04%	4.08%	6.12%	8.16%	10.20%	12.24%
	80%	0.00%	1.79%	3.57%	5.36%	7.14%	8.93%	10.71%
	90%	0.00%	1.59%	3.17%	4.76%	6.35%	7.94%	9.52%
	100%	0.00%	1.43%	2.86%	4.29%	5.71%	7.14%	8.57%

TABLE 1c: THE MAXIMUM BORROWING PROPORTION FOR A POSITIVE CFR

Enter the franking credit rate	30.00%

Maximum proportion		Yield						
		1.0%	2.0%	3.0%	4.0%	5.0%	6.0%	7.0%
Int. Rate	3%	47.62%	95.24%	142.86%	190.48%	238.10%	285.71%	333.33%
	4%	35.71%	71.43%	107.14%	142.86%	178.57%	214.29%	250.00%
	5%	28.57%	57.14%	85.71%	114.29%	142.86%	171.43%	200.00%
	6%	23.81%	47.62%	71.43%	95.24%	119.05%	142.86%	166.67%
	7%	20.41%	40.82%	61.22%	81.63%	102.04%	122.45%	142.86%
	8%	17.86%	35.71%	53.57%	71.43%	89.29%	107.14%	125.00%
	9%	15.87%	31.75%	47.62%	63.49%	79.37%	95.24%	111.11%
	10%	14.29%	28.57%	42.86%	57.14%	71.43%	85.71%	100.00%
	11%	12.99%	25.97%	38.96%	51.95%	64.94%	77.92%	90.91%
	12%	11.90%	23.81%	35.71%	47.62%	59.52%	71.43%	83.33%

So the minimum yield necessary for a margin lending investment, under the above conditions, is given by

$$y^* > c'(r - g/t') > 0.70 \times (0.07 - 0.01/0.515) > 0.0354 > 3.54\%$$

Table 2a, which is taken from the spreadsheet model, illustrates the effect of different interest rates and different capital growth rates on the minimum yield necessary for margin lending.

By monitoring the changes in the values of the minimum yield for the different columns and rows of Table 2a, it can be observed that:

- As the borrowing interest rate increases, the minimum yield necessary increases;
- As the capital growth rate increases, the minimum yield necessary decreases;
- For high capital growth rates and low borrowing interest rates, there is no minimum yield (as indicated by negative values).

THE MAXIMUM INTEREST RATE ALLOWABLE FOR MARGIN LENDING

From formula 2b above, the maximum interest rate allowable for margin lending is given by the formula

$$r^* < y/c' + g/t'$$

A demonstration of the above formula follows :

If the yield provided by the company is 2%, then y = 0.02.

If the average franking credit rate is 30%, then c = 0.30 and c′ = 1 – 0.30 = 0.70.

If the average capital growth rate of the shares is 1%, then g = 0.01.

If the personal tax rate is 48.5%, then t = 0.485 and t′ = 1 – 0.485 = 0.515.

So the maximum interest rate allowable for a margin lending investment, under the above conditions, is given by

$$r^* < y/c' + g/t' > 0.02/0.70 + 0.01/0.515 > 0.0480 > 4.80\%$$

Table 2b, which is taken from the spreadsheet model, illustrates the effect of yields and different capital growth rates on the maximum interest rate allowable for margin lending.

By monitoring the changes in the values of the maximum interest rate allowable for the different columns and rows of Table 2b, it can be observed that:

- As the yield increases, the maximum interest rate allowable increases;
- As the capital growth rate increases, the maximum interest rate allowable also increases;
- For high yield and high capital growth rates, the interest rate charged could be very high before becoming prohibitive to margin lending investments.

To summarise: Margin lending does NOT achieve a higher ROE for any share investor if the yield is less than c′(r – g/t′), or if the interest rate is greater than y/c′ + g/t′.

CONCLUSION

This article aims to assist advisers in their explanations to investors. It extends the previous performance model by deriving, interpreting and demonstrating five practical extensions.

For the type of investor that wishes to maintain a positive CFR, it is important that the yield is at least c′rp, the interest rate is at most y/(pc′), and the borrowing proportion is at most y/(rc′).

Investors adopt margin lending in order to achieve a higher ROE.

For any investor with margin lending, it is critical that the yield is at least c′(r – g/t′), and that the interest rate is at most y/c′ + g/t′. J

TABLE 2a: THE MINIMUM YIELD NECESSARY FOR MARGIN LENDING

Enter the franking credit rate	30.00%
Enter your personal tax rate	48.50%

Minimum yield		Interest rate						
		4.0%	5.0%	6.0%	7.0%	8.0%	9.0%	10.0%
Growth	0%	2.80%	3.50%	4.20%	4.90%	5.60%	6.30%	7.00%
	1%	1.44%	2.14%	2.84%	3.54%	4.24%	4.94%	5.64%
	2%	0.08%	0.78%	1.48%	2.18%	2.88%	3.58%	4.28%
	3%	-1.28%	-0.58%	0.12%	0.82%	1.52%	2.22%	2.92%
	4%	-2.64%	-1.94%	-1.24%	-0.54%	0.16%	0.86%	1.56%
	5%	-4.00%	-3.30%	-2.60%	-1.90%	-1.20%	-0.50%	0.20%
	6%	-5.36%	-4.66%	-3.96%	-3.26%	-2.56%	-1.86%	-1.16%
	7%	-6.71%	-6.01%	-5.31%	-4.61%	-3.91%	-3.21%	-2.51%

TABLE 2b: THE MAXIMUM INTEREST RATE ALLOWABLE FOR MARGIN LENDING

Enter the franking credit rate	30.00%
Enter your personal tax rate	48.50%

Minimum yield		Yield						
		1.0%	2.0%	3.0%	4.0%	5.0%	6.0%	7.0%
Growth	0%	1.43%	2.86%	4.29%	5.71%	7.14%	8.57%	10.00%
	1%	3.37%	4.80%	6.23%	7.66%	9.08%	10.51%	11.94%
	2%	5.31%	6.74%	8.17%	9.60%	11.03%	12.45%	13.88%
	3%	7.25%	8.68%	10.11%	11.54%	12.97%	14.40%	15.83%
	4%	9.20%	10.62%	12.05%	13.48%	14.91%	16.34%	17.77%
	5%	11.14%	12.57%	13.99%	15.42%	16.85%	18.28%	19.71%
	6%	13.08%	14.51%	15.94%	17.36%	18.79%	20.22%	21.65%
	7%	15.02%	16.45%	17.88%	19.31%	20.74%	22.16%	23.59%