NTNU Trondheim
Norwegian University of
Science and Technology

Faculty of Social Sciences
and Technology Management
Department of Industrial Economics
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EXAM IN COURSE TIØ4146
FINANCE for SCIENCE and TECHNOLOGY STUDENTS
December 1th, 2012
Time: 09.00 - 13.00
deadline for examination results: week 1

Aid A: All calculators allowed
              All printed and written material allowed

Problem 1 (weight 15%)

Firth analysed the price effects of announcements that another company had acquired 10% of a company's shares. Ownership of more than a certain percentage of a company's shares must be made public in most countries and in the USA, to which the study refers, this percentage is 10. Firth uses the market model and his results show that, over 30 days before the announcement, the CAAR of the companies being invested in is 4.8%. On the announcement day the CAAR rises by almost 3.5 percentage points to 8.3%. After the announcement the CAAR shows a gradual reduction of around 2 percentage points over a period of 20 days. All percentages and changes therein are statistically significant.

a) Does the CAAR of 4.8% before the announcement day contradict the Efficient Market Hypothesis (EMH)? If so, explain which form of the EMH it contradicts.

b) Does the change in CAAR of +3.5 percentage points on the announcement day contradict the Efficient Market Hypothesis (EMH)? If so, explain which form of the EMH it contradicts.

c) Does the change in CAAR of -2 percentage points after the announcement day contradict the Efficient Market Hypothesis (EMH)? If so, explain which form of the EMH it contradicts.

Problem 2 (weight 35%)

Håvard Hughes made his millions in the oil industry. His company, HughOil, has a debt-to-value ratio of 75% and a return on equity of 17%. He is always looking for profitable investments and he sees a business opportunity in the film industry. With the help of his friendly banker he collected the following information about the equity beta's (β_e), stock return volatility (annual standard deviation), leverage (debt/total assets in market values) and cost of debt (r_d) of the three leading companies in the film industry.

Company	β_e	Volatility $r_{eq.}$	Debt/Value	r_d
United Actors	2.2	35%	.4	6%
Wiener Brothers	2.1	30%	.5	6.5%
Parachute Pictures	1.9	27.5%	.6	7%

Håvard considers starting his own film studio under the name 'HughMovies'. The Hugh-Movies project requires an investment of €315 million and is expected to produce a perpetual after tax cash flow of €25 million per year. His banker assures him that the HughMovies project has a debt capacity of 80% and his bank is willing to supply the corresponding loan at 9% interest. In addition you can assume the following. The unweighted averages of the three leading companies accurately represent the film industry. All debt in the film industry is rebalanced. The risk free interest rate is 5%, the market risk premium is also 5% and the corporate tax rate is 40%. Personal taxes can be ignored.

a) Should Håvard Hughes go ahead with the HughMovies project or not? Use calculations to support your answer and make additional assumptions if necessary.

Problem 3 (weight 35%)

After a successful start in Ystad, Wallander Security Guards is considering to expand its business into the dangerous city of Malmö. The expansion decision has to be made immediately, the expansion requires an investment of 380 million SEK and will produce future cash flows with a present value of 375 million SEK. The expansion is very risky: Wallander's security concept may be a success in the market, but it can also fail. In financial terms this means that, over the next 2 years, the value of the future cash flows can either increase with 30% or decrease with 23% per year. If Wallander takes on the Malmö project, it can build up the scale and the experience that are necessary to further expand into Stockholm after two years. The Stockholm project is twice the size of the Malmö project: it requires twice the investment amount and produces cash flows that have twice the value of the Malmö project's cash flows in 2 years. Assume that the investment amount will increase over time with the risk free interest rate of 7% per year.

a) Should Wallander go ahead with the Malmö project or not? Show calculations to support your answer and make additional assumptions if necessary.

Problem 4 (weight 15%)

The so-called trade-off theory of optimal capital structure has practical implications for everyday situations. Below, groups of companies are pairwise contrasted. Assuming that all other things are equal, which of each pair is predicted to have a higher debt ratio (debt/total value) by the trade-off theory?

a) A transport company, owning a few trucks OR a travel agency, operating with a few employees.

b) A software house, supplying the software for a central government project OR a computer importer, supplying the hardware for the same project.

c) A new, fast growing retail chain OR an old, established retail chain.

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Problem 1 (weight 15%)

a) No, pre-event CAAR can occur for different reasons, for instance sample selection bias. In this study, Firth suggests either information leakage or the more likely explanation that the investing institution quickly builds up its 10% stake prior to releasing the information, so that the price it pays does not reflect the information content of the announcement. The increased buying activity will drive up the price and, thus ,the pre-event CAAR.

b) No, the CAAR on the announcement day should reflect the information content of the announcement.

c) Yes, a price reduction after the announcement of positive news suggests that investors overreact: their initial reaction to the news is too optimistic and a correction follows. Since the announcement of a minority holding is public information, this contradicts the semi-strong form of market efficiency.

Problem 2 (weight 35%)
Håvard Hughes should go ahead with the HughMovies project if it has a positive NPV. To calculate NPV we need the cash flow and investment (both given) and the proper discount rate. The discount rate is determined by the characteristics of the project; the background data on HughOil are irrelevant. The business risk and the corresponding opportunity cost of capital can be calculated from the unweighted averages of the three leading companies in the film industry since this average accurately represents the film industry. The opportunity cost of capital can be calculated directly or using the asset β. To calculate r_a directly, we first calculate r_e using the CAPM:

Company	β_e	r_e
United Actors	2.2	$r_e = .05 + .05 \times 2.2 = .16$
Wiener Brothers	2.1	$r_e = .05 + .05 \times 2.1 = .155$
Parachute Pictures	1.9	$r_e = .05 + .05 \times 1.9 = .145$

With these r_e and the given r_d and rebalanced debt we can 'unlever' to find $r_a = r_e \times E/V + r_d D/V$:

Company	$r_e \times E/V$	$r_d \times D/V$	r_a
United Actors	$.16 \times .6$	$.06 \times .4$	.12
Wiener Brothers	$.155 \times .5$	$.065 \times .5$	.11
Parachute Pictures	$.145 \times .4$	$.07 \times .6$	.10

We could also have used the CAPM 'in reverse' to find β_d, unlever the $\beta's$ to find β_a and then use the CAPM to find r_a. Finally, we could also have used the formula for r_e: $r_e = r_a + (r_a - r_d)D/E$ in reverse to find r_a. In all cases, the average r_a is .11 or 11%.

We now know the opportunity cost of capital, the projects' cost of debt ($r_d = .09$) and the projects debt ratio (D/V=.8), so that we can calculate the WACC. The new r_e becomes: $r_e = r_a + (r_a - r_d)D/E = .11 + (.11 - .09).8/.2 = .19$, which gives a project WACC of: $((1 - .4) \times (.8) \times .09) + (.19 \times .2) = 0.0812$.
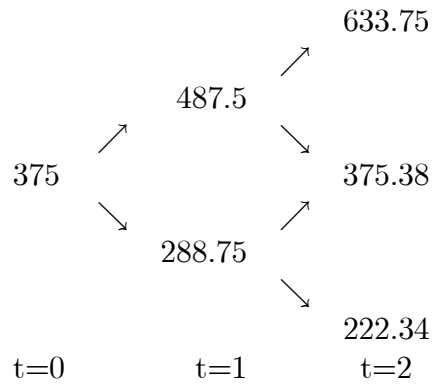
Alternatively, we could have used the Miles-Ezzell formula to find the project WACC: $r' = r_a - \tau r_d L \left(\frac{1+r_a}{1+r_d} \right) = .11 - .4 \times .09 \times .8 \times \frac{1.11}{1.09} = .081$.

With a discount rate of .081, the value of the cash flows is $25/.081 = 308.64$. NPV=$308.64 - 315 = -6.36 < 0$. Håvard Hughes should not go ahead with the HughMovies project.

Using APV we get: base case is $25/.11 = 227.3$. The tax advantage, discounted at the OCC is $.4 \times .09 \times .8 \times 315 = 9.072/.11 = 82.473 \times \frac{1.11}{1.09} = 83.986$. Total APV is $227.3 + 83.986 = 311.3 < 315$. Håvard Hughes should not go ahead with the HughMovies project.

Oppgave 3 (vekt 40%)

The Malmö project itself is loss making: its NPV is $375 - 380 = -5.0$ million SEK. But attached to it is the real option to expand into Stockholm. With today's information the Stockholm project is also loss making, its NPV is twice that of the Malmö project, -10. However, the decision about the Stockholm project does not have to be made with today's information, Wallander has the real option to wait and see. If its security concept is a success in the Malmö market, it can profit from the opportunity and expand into Stockholm. If the Malmö project fails it can walk away from the Stockholm project. The real option is a call: Wallander can 'buy' the cash flows from the Stockholm project by 'paying' he investment amount. To calculate the value of the real option we first set up the tree for the cash flows values:

$$
\begin{array}{cccccc}
& & & & 633.75 & \\
& & & \nearrow & & \\
& & 487.5 & & & \\
& \nearrow & & \searrow & & \\
375 & & & & 375.38 & \\
& \searrow & & \nearrow & & \\
& & 288.75 & & & \\
& & & \searrow & & \\
& & & & 222.34 & \\
t{=}0 & & t{=}1 & & t{=}2 &
\end{array}
$$

The parameters of the binomial model are: $u = 1.3,\ d = 0.77$ and $r = 1.07$ so that

$$
p = \frac{r - d}{u - d} = \frac{1.07 - 0.77}{1.3 - 0.77} = 0.566
$$

The investment amount for the Stockholm project after 2 years is: $2 \times 380 \times 1.07^2 = 870.12$. At t=2, the present value of the future cash flows from the Stockholm project is either:

$633.75 \times 2 = 1267.5$

$375.38 \times 2 = 750.76$, or

$222.34 \times 2. = 444.68$

Of course, the option to further expand into Stockholm will only be exercised if it is profitable to do so, the payoffs in three end nodes are:

$\max[0, 1267.50 - 870.12] = 397.38$

$\max[0, 750.76 - 870.12] = 0.0$

$\max[0, 444.68 - 870.12] = 0.0$

these payoffs have a t=0 value of

$$
\frac{0.566^2 \times 397.38}{1.07^2} = 111.19
$$

The value of the Malmö project including the value of the real option to expand into Stockholm is thus: $-5 + 111.19 = 106.19 > 0$. Wallander should go ahead with the Malmö project.

Oppgave 4 (vekt 10%)

a) The transport company, its assets (trucks) have a higher second hand value and, thus lower default costs than the assets of a travel agency

b) The computer importer, for the same reason (its assets (computers) have a higher second hand value than the assets of a software house) and both software and hardware need maintenance.

c) The old, established retail chain, growth opportunities are firm specific and have little, if any, second hand value