Capital investment decisions: the case of diamond plc

Finance, Investment

Introduction

This assignment is based on Capital investment decisions: the case of Diamond Chemicals plc. A critical analysis of thiscase studywill examine the characteristics and concerns in the case study. This research will discuss the use of Discounted Cash Flow (DCF) techniques known as Net Present Value (NPV) and Internal Rate of Return (IRR), which are the two most popular and important techniques in investment decisions. Although these two techniques are closely-related, they have fundamental differences between each other. “ The IRR is the discount rate that makes the present value of a future stream of cash flows equal to the initial investment(s). Arnold 2008. Whereas, NPV is the “ difference between a project’s value and its cost” Breadley, Myers and Allen, 2006.

Literature Review

Three research articles will be reviewed focusing on the performances ofNPV and IRRrelating to real cases in investment evaluation. “ Do managers of South African manufacturing firms make optimal capital investment decisions? ” - E. Gilbert, 2003. The purpose of the study was to investigate capital budgeting behaviour of firms in South Africa.

It reveals that majority of manufacturing firms use only the NPV technique when evaluating their capital investment projects, and of the DCF techniques used, the NPV technique is used more often than the IRR. Research shows that manufacturing firms adjust the discount rate used in their NPV calculations to incorporate the project specific risk; according to the results

of this research, majority of firms do this. It considers that the majority of firms use only the NPV technique when evaluating their capital investment projects (i. e. no other techniques are used at all).

However, on average, the IRR technique is used more often than NPV (48% versus 47%). Nevertheless, in summary, the study suggests that manufacturing firms in South Africa deviate from the behaviour prescribed by corporatefinancetheory because they do not use NPV in isolation with projects specific risk adjusted discount rates when evaluating capital investment projects. The next article titled " Capital budgeting practices in the US. Forest product industry: A reappraisal" - L. S. Hogaboam and S. R. Shook, 2004. This study observed the capital investment practices of publicly owned forest roduct firms in the U. S. in 2001by replicating research reported by Cubbage and Redmond in 1985. In this research Baile et al (1979) conducted a survey and case study of capital budgeting inthe forestproducts industry and found that most forest products companies had formal budgeting systems, but these companies lacked post audit procedures, did not account for risk and utilized primitive risk adjustment methods. The researchers correlated the use of NPV and IRR to the size of the firm, finding that firms that had smaller gross sales revenue primarily used payback period for their projects.

Nine firms ranked NPV either first or second in evaluation criteria importance, whereas IRR was considered most important evaluation criteria in the Idaho survey mutual exclusive projects. Financial literature indicates NPV is best for capital rationing, and 7/15 of firms indicated that IRR was

their primary choice in case of rationing. This survey specifies that the IRR technique is most popular for the evaluation of mutually exclusive projects, even though most financial literature considers it to be inaccurate when compared to NPV.

The third article “ Capital Budgeting Practices: A Survey in the Firms in Cyprus” investigates: 1. the methods used by the Cyprus companies to evaluate investments, and 2. the approach adopted to handle important estimation problems inherent to the use of these methods. It was found that 54. 43% of projects evaluation is done by means of a simplified evaluation technique and that 36. 71% of the companies use the payback period technique. Among the methods that take into account the time value ofmoneyconcept, the NPV method is the one most companies prefer, and only 8. 86% of them use IRR.

In this study Hatfield, Horvath, and Webster (1998) investigated the importance of payback, average rate of return, IRR, and NPV capital budgeting techniques for the performance and value measures of firms. They found that firms analyzing all projects have higher share prices on average. They also found, in contrast to the theory of finance, that the NPV technique is not maximizing the value of the firm. Their results indicated that it is best not to rely on any single capital budgeting technique but instead to apply all of them or as many of them possible for a project evaluation.

Advantages and Disadvantages of Net Present Value (NPV)

NPV is a very popular method of project appraisal; starting with the advantages; According to Pike and Neale (2006), the NPV rule accepts all investments offering positive NPVs when discounted at the equivalent market rate of interest. This results in an increase in the market value of the firm and thus the increase of the shareholder's stake in the firm. NPV takes into account the time value of money - It recognises that ? 1 today is greater than ? 1 tomorrow; Breadley, Myers and Allen explain that it is because today can be invested to start earning interest immediately.

They also argue that NPV rule allows thousands of shareholders who may have vastly different levels of wealth and attitudes toward risk to participate in the same enterprise and to delegate its operations to a professional manager. " One of the rules of Capital budgeting demands that managers be able to consider one project independently of all others – this is known as the value-additivity principle, it implies that the value of the firm is equal the sum of the values of each of its projects. " – Copeland, Weston and Shastri (2005).

Arnold states that NPV finds out not only which project gives a positive return, but which one gives the greater positive return and that one of the major elements that leads to the theoretical dominance of NPV is that it takes into account the scale of investments. NPV is a superior technique to IRR because it has fewer limitations. Those limitations include the fact that both inflows and outflows are measured in form of present dollars, not as

percentage, many people find it complicated to work with a dollar return rather than a percentage return.

Another limitation would have to be the requirement of an estimate of the cost of capital to be able to calculate the NPV. William Megginson considered that financial managers find it hard to use NPV because it does not measure benefits relative to the amount invested. Though the NPV formula is constructive in evaluation of investment opportunities, the process is not faultless.

Advantages and Disadvantages of Internal Rate of Return (IRR)

Financial managers prefer IRR because it is attributable to the general isposition of business people toward rates of return rather than actual dollars as interest rates, probability and so on are most often expressed as annual rates of return, making it an advantage of this technique. The calculations of IRR is an advantage, meaning the fact that IRR is simply the discount rate that make the NPV equals to Zero is important because it tells us how to calculate the returns on more complicated investments (Ross, Westerfield, Jordan – 2006). IRR indicates the rate of return receivable when money is put into a project.

Arnold (2008) acknowledges that IRR describes how much the cash inflows exceed the cash outflows on an annualised percentage basis, taking into account of the timing of those cash flows. Like NPV, IRR also has the advantage of being a ‘ time-adjusted’ measure of profitability. ‘ Financial Theory and Corporate Policy’ by Ross, Westerfield and Jordan recognises that “ the IRR rule errs in several ways. It does not obey the value-additivity

principle, and consequently managers who use the IRR cannot consider projects independently of each other.

Second, the IRR rule assumes that funds invested in projects have opportunity costs equal to the IRR for the project. This implicit reinvestment rate assumption violates the requirement that cash flow be discounted at the market-determined opportunity cost of capital. Finally, IRR rule can lead to multiple rates of return whenever the sign of cash flow changes more than once. ” may give the wrong ranking of mutually exclusive projects that differ in economic life or in scale or required investment.

General Formulas for Net Present Value (NPV) and Internal Rate of Return (IRR)

Net Present Value (NPV) formula

Where CF0 = cash flow at time zero (t0), and CF1 = cash flow at the time one (t 1), one year after time zero. The decision rules for net present value are: NPV Accept NPV < 0 Reject Formula applied to cash flow suggested by Frank Greystock

| Year | Cash flow (? m) | Discounted cash flow (? m) | | 0 |-9 |-9 | | 1 | 1. 4 |? 1. 27 | | 2 | 2. 66 |? 2. 0 | | 3 | 3. 09 |? 2. 32 | | 4 | 3. 06 |? 2. 09 | | 5 | 3. 02 |? 1. 88 | | 6 | 2. 49 |? 1. 41 | | 7 | 2. 47 |? 1. 27 | | 8 | 2. 45 |? 1. 14 | | 9 | 2. 43 |? 1. 03 | | 10 | 2. 1 |? 0. 93 | | 11 | 1. 68 |? 0. 59 | | 12 | 1. 68 |? 0. 54 | | 13 | 1. 68 |? 0. 49 | | 14 | 1. 68 |? 0. 44 | | 15 | 1. 68 |? 0. 40 | | | | Total (NPV) ? 9. 00 |

Internal Rate of Return (IRR) formula

The internal rate of return, r, is the discount rate at which the net present value is zero. It is the value for r which makes the following equation hold: Formula applied to cash flow suggested by Frank Greystock The following tables show the percentages utilized for the trial and error phase, in order to produce an NPV of zero.

| Table 1 | | | | | | | Yearly | Cash Flows (?) | Discounted Cash Flow (? m) | | | Intervals | | | | | | | | 0 |-9. 00 |-9. 00000 | | | 1 | 1. 40 | 1. 11111 | | | 2 | 2. 66 | 1. 67549 | | | 3 | 3. 9 | 1. 54471 | | | 4 | 3. 06 | 1. 21406 | | | 5 | 3. 02 | 0. 95094 | | | 6 | 2. 49 | 0. 62227 | | | 7 | 2. 47 | 0. 48990 | | | 8 | 2. 45 | 0. 8566 | | | 9 | 2. 43 | 0. 30358 | | | 10 | 2. 41 | 0. 23895 | | | 11 | 1. 68 | 0. 13220 | | | 12 | 1. 68 | 0. 10492 | | | 13 | 1. 68 | 0. 08327 | | | 14 | 1. 8 | 0. 06609 | | | 15 | 1. 68 | 0. 05245 | | | 26% | Net Present Value (? m) |-0. 02441 | | | | | Table 2 | | | | | | Yearly | Cash Flows (? m) | Discounted Cash Flow (?) | | | Intervals | | | | | | | | 0 |-9. 00 |-9. 00000 | | | 1 | 1. 40 | 1. 12000 | | | 2 | 2. 66 | 1. 70240 | | | 3 | 3. 09 | 1. 8208 | | | 4 | 3. 06 | 1. 25338 | | | 5 | 3. 02 | 0. 98959 | | | 6 | 2. 49 | 0. 65274 | | | 7 | 2. 47 | 0. 51800 | | | 8 | 2. 45 | 0. 41104 | | | 9 | 2. 43 | 0. 2615 | | | 10 | 2. 41 | 0. 25877 | | | 11 | 1. 68 | 0. 14431 | | | 12 | 1. 68 | 0. 11545 | | | 13 | 1. 68 | 0. 09236 | | | 14 | 1. 68 | 0. 07389 | | | 15 | 1. 68 | 0. 5911 | | | 25% | Net Present Value (? m) | 0. 29926 | | | | | Table 3 | | Yearly | Cash Flows (? m) | Discounted Cash Flow (? m) | | | Intervals | | | | | | | | | | 0 |-9. 00 |-9. 0000 | | | 1 | 1. 40 | 1. 07692 | | | 2 | 2. 66 | 1. 57396 | | | 3 | 3. 09 | 1. 40646 | | | 4 | 3. 06 | 1. 07139 | | | 5 | 3. 02 | 0. 81337 | | | 6 | 2. 49 | 0. 1587 | | | 7 | 2. 47 | 0. 39363 | | | 8 | 2. 45 | 0. 30034 | | | 9 | 2. 43 | 0.

22915 | | | 10 | 2. 41 | 0. 17482 | | | 11 | 1. 68 | 0. 09374 | | | 12 | 1. 68 | 0. 7211 | | | 13 | 1. 68 | 0. 05547 | | | 14 | 1. 68 | 0. 04267 | | | 15 | 1. 68 | 0. 03282 | | | 30% | Net Present Value (? m) |-1. 14726 | | | | | | | Yearly | Cash Flows (?) | Discounted Cash Flow (? m) | | | Intervals | | | | | | | | | 0 |-9. 00 |-9. 00000 | | | 1 | 1. 40 | 1. 09375 | | | 2 | 2. 66 | 1. 62354 | | | 3 | 3. 9 | 1. 47343 | | | 4 | 3. 06 | 1. 13994 | | | 5 | 3. 02 | 0. 87894 | | | 6 | 2. 49 | 0. 56616 | | | 7 | 2. 47 | 0. 43876 | | | 8 | 2. 45 | 0. 34001 | | | 9 | 2. 43 | 0. 6346 | | | 10 | 2. 41 | 0. 20413 | | | 11 | 1. 68 | 0. 11117 | | | 12 | 1. 68 | 0. 08685 | | | 13 | 1. 68 | 0. 06785 | | | 14 | 1. 68 | 0. 05301 | | | 15 | 1. 68 | 0. 4142 | | | 28% | Net Present Value (? m) |-0. 61758 | | | | | |

Interpolation illustrates that there is a yield rate (r) which lie between 25 per cent and 26 per cent which will produce an NPV of zero. The way to find that discount rate is to first find the distance between points A and B as a proportion of the entire distance between points A and C.

Critical Analysis

“ Greystock included in the first year of his forecast preliminary engineering costs of ? 00, 000, which had been spent over the preceding nine months on efficiency and design studies of the renovation. ” The preliminary costs of ? 500, 000 were irrelevant because it would not have been incurred if not for the possibility of Greystock going ahead with the renovation; therefore it was a sunk cost. The development cost of ? 500, 000 should be ignore because they are bygones and are of the past as it was incurred nine months before and does not need to be added into the cash flow. “ The corporate manual stipulated that overhead costs be reflected in project analyses at the rate of

3. % times the book value of assets acquired in the project per year". According to Arnold (2008), not all overhead costs are incremental; when trying to assess the viability of a project only the incremental costs are incurred by going ahead are relevant. Those cost which are unaffected therefore irrelevant. Meaning that the capital projects which should reflect an annual pre-tax charge amounting to 3. 5% of the value of the initial asset investment for the project – it should be entered in the incremental cash flow because it is an irrelevant overhead cost.

Rotterdam sales are producing negative results due to the decision made by Greystock to shift capacity to Rotterdam away from Merseyside. His new business decision is having a negative effect on Rotterdam because all the expenditure is coming from Merseyside as he has decided to renovate it, cannibalizing Rotterdam. Even the director of sales recognised there was " oversupply in the works", which means that too much is being supplied for the project. In view of adjustment of cash flow must be consistent with inflation forecast imbedded in discount rate.

The treasury staff was concerned because the project would impound a long-term inflation of 3% per year. The unrelated EPC project is not relevant as it would only increase prices when recession ended despite the ? 1 million pound renovation ; the criterion is that each individual investment promises an IRR greater than 10%, not that multiple projects promise an average return above this hurdle. Before submitting a project for senior management, at least three performance " hurdles" had to be met in order for proposal to be considered. -Impact on earnings per share = ? 0. 018 -Payback = 3. years

-Discounted cash flow (NPV) = ? 9 Million Although the Merseyside project met all the criteria, Morris should have considered dividing the proposal into requires and desire expenditure (relating to April Novelties). Concerns and characteristics – Merseyside The main concern for Merseyside is the old production process and how it is not continuous at times, and it has a " higher labour content than its competitors' newer plants. However, regardless of these limitations the Merseyside plant has many good characteristics such as: • Receiving positive cash flows immediately Higher cash flows in the beginning • Relatively short payback period Concerns and characteristics – Rotterdam The lack of flexibility and commitment to plant project are concerns for the Rotterdam plant as it is not being renovated and we remain unsure as to whether Greystock will take on the project of renovation at Rotterdam. On the other hand, the fact that the polymerization process has become continuous is major strength, and also that the payment schedule is flexible (over four year period). In addition the Japanesetechnologyhas proven to be successful in Japan.

Conclusion

This assignment has summarized the Case study while emphasizing important details of the concerns and characteristics of the Merseyside and Rotterdam plant. Opportunities such as Land value and Use of right of way can enable Rotterdam to develop positively, despite German technology posing as a threat and also losing right of way. Overall the Merseyside plant offers numerous opportunities to increase outputs and lower costs, while also increasing competitiveness for their competitors.

Nevertheless Merseyside faces a very big threat where they would have to close for 45 days causing their customers to buy from their competitors, although the lost market share can still be regained. The investment appraisal process requires the use of sophisticated evaluation techniques such as Net present value (NPV) and Internal rate of return (IRR). These techniques help ensure that all relevant cost and other factors have been considered. The calculations of NPV and IRR are quite challenging, especially regarding the trial and error method IRR.

The calculations to obtain –NPV= 0- was time consuming and more than twice as long as the NPV method. If risk adjustment is made through the discount rate there may be more than one cost of capital and the sponsor then has to classify the project into say high or medium or low risk categories etc. Finally, it can be argued that the process of capital budgeting is a time-waster because the fundamental information used is seen to be undependable. As the estimates of cash proceeds are just guesses and that the use of anything other than the easiest technique of capital budgeting is as unsuccessful as making use of any complicated formulas.

For example, in 1974 K. Larry Hastie published his classic paper, “ One Businessman’s View of Capital Budgeting. ” His position is that firms should avoid excessively complex measurement techniques. He states: “ Investment decision making could be improved significantly if the emphasis were placed on asking the appropriate strategic questions and providing better assumptions rather than on increasing the sophistication of measurement techniques” (1974, p. 36).

This research establishes that NPV and IRR are two major investment decision methods, which gratifies the criteria for the accurate evaluation of capital projects.

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