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Notes for **Nextel Peru: Emerging Market Cost of Capital**

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1 Your Assignment

Your assignment is conduct the necessary analysis and write a report addressing the issues raised in the last two paragraphs of the case. Here is the key sentence: "Ultimately, he [Rafael d'Anconia] wanted to understand whether the $400 million purchase price for Nextel Peru was reasonable." Your report should be based on the situation, facts and figures presented in the case and the associated spreadsheet.[1] Not all the information you need for your analysis is available in a factual manner. As a result, there won't be an unambiguous Yes/No answer supported by a unique numerical value. The best you will be able to do is come up with a range of scenarios in which the acquisition of Nextel Peru for $400 million would be a good idea and scenarios in which it won't be. What is important is that you follow a correct (note that I said "a correct", not "the correct") and internally consistent process. You will have to make some assumptions or choices in your report. State your assumptions[2] and choices, and provide justification for them.

The value of an asset, Nextel Peru in this case, depends on expected future cash flows and the cost of capital. Many of you have not had managerial finance (MBC 633) where valuation is discussed. To compensate for that, I have provided some background material in this document. I am sure that you will have follow up questions. Please post them on the course Wall. I will answer them just as quickly as I can. I will gladly host online office hours if it becomes necessary.

Submit the first draft of your report by February 20. I will send you feedback within a few days of getting your draft. The final report is due by March 6.

2 Valuation

Suppose you have to bid for an asset, perhaps a company. You *expect* the asset to be worth $3.5 million in one year. While you *expect* the value to be $3.5 million, you are also aware that the *actual* value may be lower or higher than expected. In fact, you are 95% confident that the actual value will be between $1.2 million and $5.4 million. Based on your estimate of the uncertainty and therefore the risk of investing in the asset, you think that an expected return of 20% per year would be fair for this investment. Using these numbers, the value of the asset today is:

$$V_0 = \frac{E(V_1)}{(1+r)^1} = \frac{\$3.5 \text{ million}}{(1+20\%)^1} = \$2.916666667 \text{ million} \approx \$2.917 \text{ million}$$

This calculation determines the *present value* of the expected future value. So, you should be willing to bid up to $2.917 million for the asset. If you bid more than $2.917 million, your expected return will be less than 20%. If you can get the asset for less than $2.917 million, your expected return will be more than 20%.

A reverse calculation shows that if you invest $2.917 million in the asset now, you *expect* to make a rate of return of

$$\frac{\$3.5 \text{ million} - \$2.917 \text{ million}}{\$2.917 \text{ million}} = \frac{\$0.583 \text{ million}}{\$2.917 \text{ million}} = 20\% \text{ per year}$$

[1] The associated spreadsheet, HBS No. 916-518 has been uploaded in the files section of the LMS. It contains Exhibits 1–4 as well as an additional Exhibit 6 which contains some data that may be useful in your calculations.

[2] Be aware that there are good assumptions and there are bad assumptions.

However, within the 95% range of possibilities, your rate of return could be as low as

$$\frac{\$1.2 \text{ million} - \$2.917 \text{ million}}{\$2.917 \text{ million}} = \frac{-\$1.717 \text{ million}}{\$2.917 \text{ million}} = -0.588571429 \approx -58.86\% \text{ per year}$$

or as high as

$$\frac{\$5.4 \text{ million} - \$2.917 \text{ million}}{\$2.917 \text{ million}} = \frac{\$2.483 \text{ million}}{\$2.917 \text{ million}} = 0.851428571 \approx 85.14\% \text{ per year}$$

The possibility of losing as much as 58.86% of your investment is the risk in this situation. It is because of this risk that you are *requiring* an *expected* return of 20%. If there were no risk in the asset, i.e., its value were guaranteed to be $3.5 million next year, you might be happy earning 4% rate of return on your investment. In that case, the value of the asset would be

$$V_0 = \frac{\$3.5 \text{ million}}{(1+4\%)^1} = \$3.365384615 \text{ million} \approx \$3.365 \text{ million}$$

So, you would bid as much as $3.365 million in this scenario.

Most assets will not have just a one year life. They may provide cash flows for several years. A special case relevant to the Nextel Peru case is this: Suppose an asset is expected to provide $5 million in cash flow next year and the cash flows are expected to grow at the rate of 4% per year after that. The first few expected cash flows (in millions), therefore, are $5, $5.20, $5.408, and $5.62432. The cash flows will continue forever, in perpetuity. Such a sequence of cash flows is known as growing perpetuity. The value of the asset today is the sum of the present values of these cash flows. We can calculate the present values of individual cash flows and add the present values but, thanks to algebra, the sum of the present value of such cash flows in a growing perpetuity is given by:

$$V_0 = \frac{E(CF_1)}{r-g}$$

where $E(CF_1)$ is the expected cash flow in year 1, r is the cost of capital and g is the expected growth rate in the cash flows. Suppose the cost of capital based on your assessment of the risk of the future cash flows is 17%. Then the value of the asset is:

$$V_0 = \frac{\$5 \text{ million}}{17\% - 4\%} = \$38.46153846 = \$38.46 \text{ million}$$

If you examine the valuation equations carefully, you will notice that if the investor requires a lower expected rate of return form an asset, he/she will value the asset higher and therefore will be willing to bid more.

3 Cash Flow vs. Net Income

Valuation is based on cash flows (*CF)*, not net income. There can be substantial difference between cash flow and net income depending on depreciation, capital expenditure and working capital investment. While there are many measures of cash flow, the most commonly accepted one is free cash flow (FCF). The case provides information to let you estimate the FCF for Nextel Peru.

4 Cost of Capital

Valuing an asset also requires the cost of capital which is the expected rate of return required from the investment commensurate with its risk.[3] The higher the risk, the higher ought to be the cost of capital. In

[3] "Expected rate of return required from the investment commensurate with its risk" is often abbreviated as "required rate of return" or "expected rate of return" or just "required return" or "expected return".

other words

$$r = f(risk)$$

where r is the cost of capital and f is an increasing function in the sense that the value of the function f increases with risk. A simple linear function[4] that does the job is

$$r = r_f + risk \times \text{risk-premium per unit of risk}$$

Here is a numerical example:

$$r = 4\% + risk \times 6\%$$

So, if the *risk* of an investment is zero, i.e., if the investment is risk-free, the cost of capital is the risk-free rate, r_f, or 4% in the numerical example. An investment with one unit of risk has a cost of capital of $r_f + \text{risk-premium per unit of risk} = 4\% + 1 \times 6\% = 10\%$ in the numerical example. For an investment with two units of risk $r = r_f + 2 \times \text{risk-premium per unit of risk} = 4\% + 2 \times 6\% = 16\%$.

Risk need not be one dimensional. For example, an investment may be affected by risk from interest rates as well as commodity prices. If there are two sources of risk, we would write:[5]

$$r = r_f + risk_1 \times \text{risk-premium per unit of risk}_1 + risk_2 \times \text{risk-premium per unit of risk}_2$$

5 Risk

When we think of risk in the context of investment, we typically think of probability of loss (PoL) or value at risk (VaR). Probability of loss is self explanatory. Value at risk refers to the minimum loss in the event of a catastrophe, where the catastrophic event is described by it rarity, for example "once in a hundred years" or "once in a thousand years." An investment which has a higher probability of loss or a higher value at risk is considered riskier. These intuitive measures are difficult to work with mathematically. Under certain conditions, we can use the standard deviation of returns as a measure of risk since the higher the standard deviation of returns, the higher the probability of loss and value at risk.[6]

While standard deviation of returns measures the risk of an investment, not all of it is relevant to an investor who is invested in a diversified portfolio. This is because some of the risk of the investment gets "diversified away" when that investment is included in the portfolio. This reduction in risk occurs because of less than perfect correlation between the return on the investment and the returns on other investments in the portfolio. The risk of an investment to a portfolio investor, therefore, is the part of the risk that remains undiversified and gets added to the investor's portfolio. The risk contributed by an investment to the investor's portfolio is typically denoted by β, the sensitivity of the investment's returns to the portfolio returns.[7] For a US investor investing in domestic assets, the relationship is

$$r = r_f + \beta \times MRP$$

where *MRP* is the market risk premium, i.e., the additional expected return required for investing in the broad US stock market (represented by the S&P 500 index). MRP is typically considered to be between 4% and 8%. The equation above is known as the Capital Asset Pricing Model (CAPM).

This idea can be extended to multiple measures of risk as well. An equation in the Nextel Peru case considers US equity market risk (same as MRP in the equation above) and country risk:

$$\textit{Required Rate of Return} = r_f + \beta(EMRP_{US}) + \lambda(\textit{Country Risk Premium})$$

[4]The relationship between expected return and risk need not be linear. However, a non-linear relationship can be linearized by using a transformation. For example, a relationship like $y = 3 + 4x^3$ can be linearized as $y = 3 + 4z$ by defining $z = x^3$.

[5]Multiple sources of risk need not be separable as neatly as assumed here. The section titled Practitioner Use of Country Risk Premium in the Nextel Peru case provides some alternative forms.

[6]The condition basically is that the investment returns come from a normal probability distribution. We will assume that this is true in our case as well.

[7]An undiversified investor gets dominated and overruled by a diversified investor because a diversified investor requires a lower return from the asset and therefore values the asset higher.

6 Suggested Steps for Analysis

Here are the suggested steps for your analysis:

1. Forecast the expected cash flow for Nextel Peru for the next year (2013). Make sure to use free cash flow (FCF) rather than net income or other measures.
2. Nextel Peru is considered to be a mature company and therefore its future cash flows are expected to grow at a relatively low rate forever. Estimate this growth rate.
3. Decide on a model for the cost of capital. Pay attention to the the locale and the portfolio of the investor and the locale of Nextel Peru. Estimate the risk(s) and the risk premium(s). Calculate the cost of capital.
4. Use the process described in Section 2 and values from steps 1, 2 and 3 to determine the value of Nextel Peru. Based on this value, conclude whether to pay $400 million for Nextel Peru or not.
5. Since the calculated value in step 4 is based on assumptions about the expected future cash flow, projected growth rate in the cash flows, the model for cost of capital, the risk-free rate, the value(s) of measure(s) of risk and the value(s) of the risk premium(s), do some sensitivity analysis to determine the scenarios in which paying $400 million for Nextel Peru would be a good idea, and scenarios in which it won't be.