**Valuation of Synergies and Embedded Real Options**

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*Question: Valuation of Synergies*

Acquirer Co Ltd (ACL) is considering acquiring Target Co Ltd (TCL). The managers of ACL anticipate the following synergies:

1) **Cost-Savings and Asset Reduction Synergy:** The managers of ACL anticipate pretax cost savings of $50 million in the first year of the deal, and $100 million the next year, and that thereafter the savings would grow at the rate of inflation, 2%. The firm must invest $1 billion to achieve these savings, and starting in the third year, must spend 5% of the pretax savings to sustain the rate of savings. As part of the rationalization of operations, some assets will be sold, generating a positive cash flow of $20 million net of tax in years 1 and 2, and $10 million in year 3. The management anticipate that the growth rate of the cash flow from year 6 (to perpetuity) will be 2%. The analyst judges that these cost savings are rather certain, reflecting a degree of risk consistent with the variability in the firm's EBIT.

2) **Revenue Synergy:** The managers also anticipate that the combination of two firms will expand revenues through cross-selling of products, efficient exploitation of brands, and geographic and product-line extension. They forecast revenue growth of $100 million in the first year and $200 million in year 2 and thereafter the revenue will grow at the rate of inflation, 2%. The cost of goods underlying these new revenues is 45 percent of the revenues. To achieve these synergies will require an investment of $400 million initially, and 5% of the added revenue each year, to fund working capital growth. The management anticipate that the growth rate of the cash flow from year 6 (to perpetuity) will be 3%. The analyst judges that the above savings are as risky as the firm's free cash flow.

The firm's after-tax cost of debt is 6%, cost of equity is 18% and the WACC is 12%. The marginal tax rate for the firm is 40%. Calculate the expected NPV of the above two sources synergies arising from the acquisition separately.

*Question: Embedded Real Options*

A) Assume that The Home Depot (THD) is considering opening a small store in France. The store will cost 100 million FF to build, and the present value of the expected cash flows from the store is 80 million FF. The management of THD believe that by opening this store, THD acquires the option to expand into a much larger store any time over the next 5 years. The cost of expansion will be 200 million FF. At the moment, the present value of the expected cash flows from the expansion is believed to be only 150 million FF. THD still does not know much about the market for home improvement products in France, and there is considerable uncertainty about this estimate. The variance is 0.08.

i) NPV of the small store without considering the embedded option: _____

**The following questions relates to the embedded options:**

ii) Nature of Option: _____ (Call/Put)

iii) Current value of the asset: _____

iv) Exercise Price: _____

v) Time to expiration: _____

Space for working:

B) Consider an offshore oil property with an estimated oil reserve of 50 million barrels of oil. The estimated cost of developing the reserve is $600 million (irrespective of the time of developing the reserve), and the development lag is two years. Exxon has the rights to exploit this reserve for the next 20 years (excluding the two years of development lag), and the marginal value (price *less* marginal cost) per barrel is $12 currently. While the marginal value per barrel will grow over time, the present value of the marginal value will remain unchanged at $12 per barrel. Once developed, the net production revenue each year will be 5% of the value of the reserves. The riskless rate of interest is 8% and the variance in ln(oil prices) is 0.03. Exxon wants to value the real option embedded in the property using a Black-Scholes calculator and therefore wants you to give the following inputs:

i) Nature of Option: _____ (Call/Put)

ii) Current value of the asset: _____

iii) Exercise Price: _____

iv) Time to expiration: _____

v) Dividend Yield (if any): _____

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