THE VALUATION OF SMURFIT'S PREFERENCE CURRENCY UNITS

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In July 1982, the Jefferson Smurfit Group Ltd. raised £10 million[1] on the Irish market through a preference share package which had its dividends guaranteed in dollar terms and an additional bonus of a conversion right into ordinary shares in Smurfit. This article describes the problem an investor faces in attempting to evaluate such investments, and provides a framework for decision-making into which the individual can inject his own assumptions to complete the analysis.

As with all investments, the decision is a choice between alternative cash flows, both now and in the future, and the degree of certainty with which these can be forecast. There is a substantial literature dealing with the area of option valuation. However, this is not readily applicable to the Irish market. Here, we will provide an analysis, which, while not in a theoretical equilibrium framework, does provide a logical basis for assessment. Section 1 describes the Smurfit preference currency unit (SPCU), section 2 provides a simple basis for analysis and section 3 describes a simulation approach to this evaluation.

Description of the SPCUs

£10 million is being raised by a preference share issue which has a 15% coupon. The SPCU is redeemable at the Company's option at any stage between March 31st 1990 and March 31st 1997. The premium on redemption is as follows:

1990-1992	Nil
1993	2%
1994	4%
1995	6%
1996	8%
1997	10%

Both the coupon and the capital sum, including redemption premium, are guaranteed against any deterioration in the value of the Irish pound in relation to the dollar after May 15th 1982, when the dollar/pound exchange rate was $1.49 to the pound. At the date of issue of the SPCUs,

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July 28th 1982, the exchange rate had moved to $1.39 to the pound. Due to the exchange guarantee the coupon therefore had increased to 16.05%[2] and there was an additional 6.89%[3] premium on redemption of the units.

Basis of Evaluation

The attractions of the SPCU are the guaranteed income and capital protection in dollar terms and the equity conversion option. A simple basis for investment appraisal is to find a similar investment and see whether the SPCU offers a higher return without changing the risk of achieving a lower degree of risk while maintaining the return. The alternative way of providing a dollar hedge is to buy a Supranational dollar Eurobond. Provided these Eurobonds are issued by an EEC institution, such as the European Investment Bank, existing exchange control regulations allow Irish investors to buy them. It is difficult to match a qualified Eurobond exactly with the Smurfit issue, but for comparative purposes we have selected EIB 14⅝% — 15/11/1991 (U.S. Dollar Supranational). At the date of issue of the SPCU this stood at 95, with a dollar yield to redemption of 15.64% (15.4% flat).

The bond portion of the SPCU gives the following payoffs: £100 invested on 28th July 1982 gives a semi-annual dividend of 8.02%[4] and a premium on redemption of 6.89% up to 1992, increasing by 2% annually thereafter. The dollar yield to redemption is only marginally affected by the redemption year and varies between 16.30% and 16.57% with a flat yield of 16%.

Year Redeemed	Gross Redemption Yield
1990	16.57
1991	16.46
1992	16.38
1993	16.32
1994	16.32
1995	16.32
1996	16.32
1997	16.30

On a straight comparison basis, on a dollar bond guaranteed by the European Investment Bank, one earns 15.64%, whereas a bond with a similar payments but instead guaranteed by Smurfit the yield is between 16.39% and 16.57%. In return for taking on the more risky SPCU one earns an additional ¾%, as well as getting the conversion option. The rational assessment must then be whether this additional compensation adequately covers the additional risk.

For every two SPCUs held an investor may buy one ordinary share in Smurfit at a price of 80p on July 31st between 1987 and 1992. As this is a

right rather than an obligation it has a minimum value of zero. If the market believes there is some possibility of Smurfit's share price being in excess of 80 pence between the relevant dates then the right has some positive value. At the time the right is converted into ordinary shares the SPCU holder will make a profit of the then prevailing stock price less the exercise price for every two SPCUs held. This profit has to be discounted back to to-day's money to calculate the value of being given the conversion right to-day. Algebraically the value of the option for each SPCU is

$$V = \tfrac{1}{2} \text{ Max } \left[0, \frac{P_1 - 80}{(1 + r)^{d_2}} \right]$$

where V = the value of the option
P_1 = the price of Smurfit shares the day the option is exercised
r = the discount rate on Irish investments
d_2 = the number of years to exercise date.

For example, if we knew with certainty that in 1987 the Smurfit share price would be 90 pence, then using a discount rate of 20% the value of this option would be 2 pence per SPCU. In reality, of course, we do not know exactly what the price of Smurfit's shares will be between 1987 and 1992.

An alternative approach to the valuation of the option is to assume that the individual wants a long-term commitment to Smurfit shares. On this basis he can purchase the share now for 56 pence and receive the dividends from now or alternatively he can use the option in 1987 or a subsequent date to buy the share for 80 pence. Based on the current Goodbody & Wilkinson (G and W) forecast for future Smurfit dividends the following cash flows emerge:

Alternative A

	1982	*1983*	*1984*	*1985*	*1986*	*1987*
Purchase Stock	(57)					
Receive Dividends		6.52	7.18	8.61	10.33	11.37

Alternative B

	1982	*1983*	*1984*	*1985*	*1986*	*1987*
Purchase Stock						(80)

Discounting both of these alternatives at 20% gives a net outlay in 1982 terms of 32 pence under either option. However, the dividend forecasts are uncertain and while they are G and W's best estimate, if they turn out to be too high one would be better off with the conversion option, whereas if they turn out to be too low the profit foregone will not be substantial.

A Simulation Approach

In this section we analyse the SPCU in terms of probabilities which may be assigned by the prospective investor, enabling him to make a rational decision on the basis of his assumptions.

We consider the two possible options: (a) purchase of the SPCU and (b) purchase of Eurobonds and Smurfit Ordinary Shares.

In evaluating option (a) one has two cash outflows, *viz.*, the purchase price of \$1 plus the further expenditure of 40 pence in the event that the Smurfit share price is in excess of 80 pence at the exercise date. There are then two components to this investment — a bond component and an equity component. To enable comparison with the riskless Eurobond the dividends from the SPCUs must be discounted at a higher rate to reflect their greater uncertainty.

If the bond were risk-free, and the interest identical to other risk-free bonds, then the value of the bond would be 100. However, because of the exchange rate movement since May 1982, the dividends are now higher than the risk-free bonds by a factor F, where F is the ratio of the exchange rates on May 18th relative to July 5th. The value of the bond then has changed from £100 to £100 × F i.e., £106.89. However, there is a further need to adjust for the relative riskiness of the two bonds. This is done by multiplying our new bond value by an additional factor V, which reflects the relative values of discounting the payments at the risky rate relative to discounting the payments at the risk-free rate.

$$\text{Bond Value} = 100 \times F \times V$$

The expected net present value of the bond element of the SPCU is then given as follows:

$$E\,(NPV) = 100 \times F \times V - 100$$

The expected cash outflow attached to the exercise of the conversion rights is

$$\frac{(1 - p)}{2} \times \frac{80}{(1 + r_1)^{d_1}}$$

where p is the probability that the Smurfit equity price is below 80 pence d_1 years after the issue of the SPCUs and r_{f1} is the risk-free Irish interest rate. We assume that the range for P is 0 to 0.2, i.e., that there is less than a 20% chance of the growth in the Smurfit share price being less than 4.5% per annum over the next five years.

The expected NPV of option (a) then is

$$E(NPV_a) = 100 \times F \times V - 100 - \frac{1 - p}{2} \frac{80}{(1 + r_{f1})^{d_1}}$$

$$+ \text{PV (Dividends Post } d_1)$$

The alternative option (b) consists of buying $(1 - p)/2$ Smurfit shares now and spending the remainder of the expected cash flows needed for the SPCU on a similar dollar denominated Eurobond. The cash outflow on the quality portion is

$$\frac{(1 - p)S}{2}$$

where S = Smurfit ordinary share price now and the corresponding inflow is the dividend stream. The expected NPV of this investment is

$$E(NPV_b) = -\frac{(1 - p)S}{2} + \frac{(1 - p)}{2}\sum_{i=1}^{2d_2}\frac{D_i}{(1 + r_{se})^{i/2}}$$

$$+ \frac{(1 - p)}{2} \text{ PV (Dividends Post } d_1)$$

where D_i is the i^{th} dividend payment.

To see whether the SPCU is a worthwhile investment for those seeking an equity involvement in Smurfit and a currency hedge one must compare $E(NPV_a)$ with $E(NPV_b)$ and the investor should only purchase the units when $E(NPV_a)$ exceeds $E(NPV_b)$.

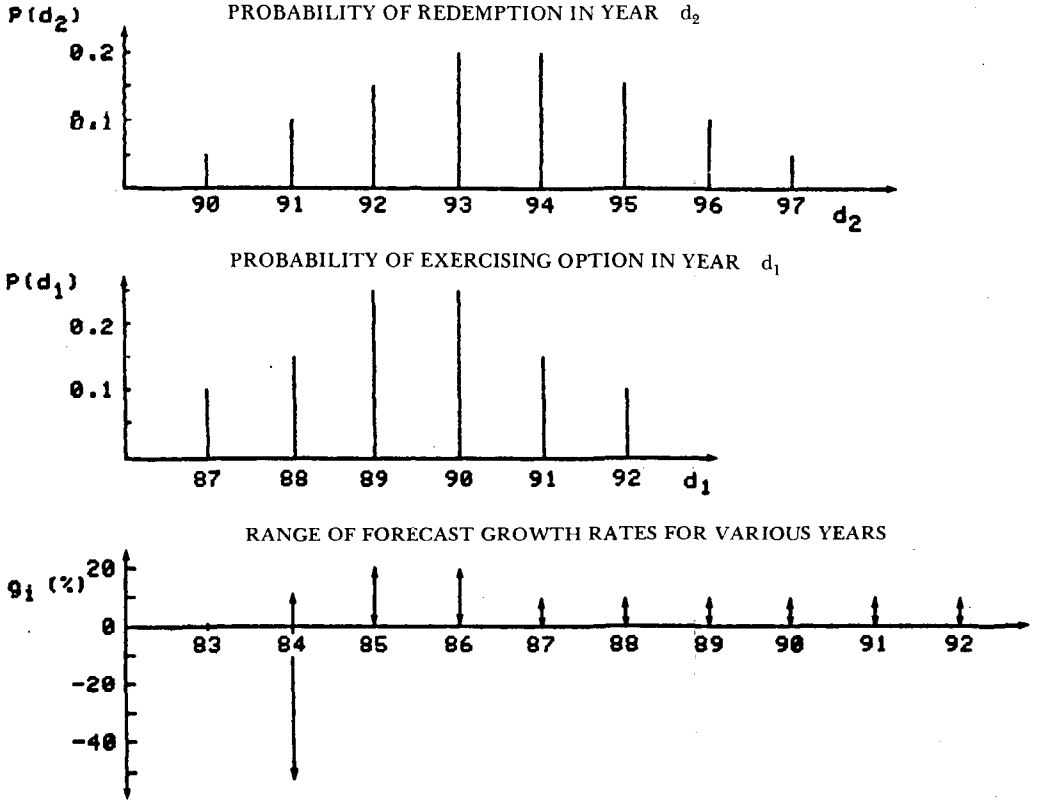
To make this theoretical approach relevant to a practical decision certain assumptions are required. The key assumptions are:

(1) The probable date of exercise of the option (d_1);
(2) The probable date of redemption (d_2) of the SPCU;
(3) The range of likely dividend growth for the years 1983-1992;
(4) The appropriate discount rate on the preference (bond) element of the SPCU (r_{sp});
(5) The appropriate discount rate on the equity dividends in Smurfit (r_{se}).

The probability distributions attaching to the probable dates, and the dividend rates are shown in Figure 1. The discount rates used are set to recognise both the increased risk in Smurfit, and the need for discount rates to increase, if Smurfit's share performance is expected to be poor. The required return on the bond element is assumed to be 1% above the riskless rate ($r_{f\$}$) on the EIB guaranteed loan. In addition to this higher returns will be required if there is some further perceived risk in Smurfit.

$$r_{sp} = r_{f\$} + .01 + p\,k_1$$

Given the 15.6% gross redemption yield on the EIB loan, this gives a minimum required return on the bond element of the SPCU of 16.6%, with a further adjustment in the event of some probability of the share price not reaching 80 pence over the relevant time period. The k_1 above is the weight ascribed to this potential fall and is assumed in the simulation



1983 : $g_1 = 0$
1984 : $g_2 = 0.1\text{-}3P$
1985-6 : $g_3, g_4 = 0.2\text{-}P$
1987-92: $g_5, \ldots, g_{10} = 0.1\text{-}0.5P$

g_i = growth rate of dividend in year i

Figure 1

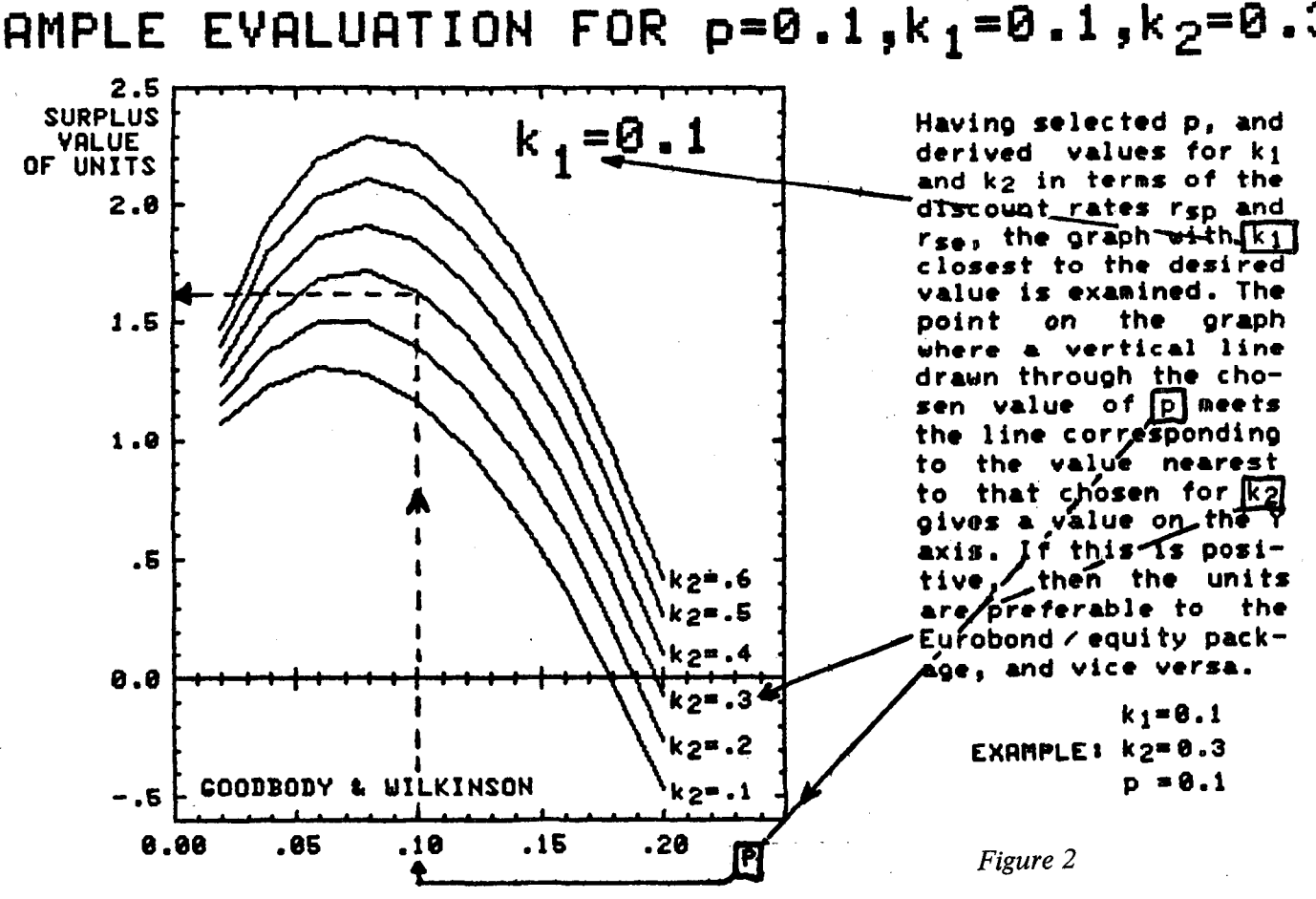

SAMPLE EVALUATION FOR p=0.1, k1=0.1, k2=0.3
2.5
SURPLUS VALUE OF UNITS
2.0
1.5
1.0
.5
0.0
-.5
k1=0.1
k2=.6
k2=.5
k2=.4
k2=.3
k2=.2
k2=.1
GOODBODY & WILKINSON
0.00
.05
.10
.15
.20
P
Having selected p, and derived values for k1 and k2 in terms of the discount rates rsp and rse, the graph with k1 closest to the desired value is examined. The point on the graph where a vertical line drawn through the chosen value of p meets the line corresponding to the value nearest to that chosen for k2 gives a value on the Y axis. If this is positive, then the units are preferable to the Eurobond / equity package, and vice versa.
EXAMPLE: k1=0.1
k2=0.3
p =0.1

Figure 2

to range between 0.1 and 0.6. Similarly, the required return on Smurfit equity is at least 1% higher than the long-term Irish gilt rate (r_{fI}), plus a further allowance for any under-performance in the share price.

$$r_{se} = r_{fI} + .01 + p\,k_2$$

Given the 18.5% gross redemption yield on long-term Irish gilts, this gives a minimum required return of 19.5%. These last two return equations can be rearranged to give values for k_1 and k_2 respectively. The investment decision then reduces to

(1) Selection of p;
(2) Calculation of k_1 and k_2 for the desired levels of r_{sp} and r_{se};
(3) Examination of Figure 2 to evaluate the surplus value of the SPCUs over the Eurobond/Equity package.[6]

If the value from Figure 2 is positive then the SPCUs should be chosen. A worked example of this is shown in Appendix 1.

Conclusion

The SPCU is an interesting and imaginative source of finance. This article has provided a simple framework for analysing the SPCUs and then has developed a simulation model to better examine the impact of the range of parameters. If anything, this model understates the value of the SPCU, because while we have valued it as a dollar bond, the SPCU also includes a guaranteed return in Irish pound terms should the dollar depreciate below those levels holding in May 1982.

Appendix 1

In this appendix, given the following assumptions, we evaluate the benefits of the SPCU relative to the alternative equity — eurobond package.

Assumptions

Gross redemption yield on dollar Eurobond	(r_{fI})	15.6%
Gross redemption yield on long Irish gilt	(r_{fI})	18.5%
Required return on Smurfit dollar bond	(r_{sp})	17.6%
Required return on Smurfit equity	(r_{se})	22.5%
Exchange rate variation May 18th to July 5th	(F)	1.07
Probability of Smurfit price being less than 80p at exercise date	(p)	10%

Dividend Growth Rates

1983	=	0%
1984	=	−20%
1985-6	=	10%
1987-92	=	5%

Given the above assumption we evaluate k_1 and k_2

$$k_1 = \frac{0.176\text{-}0.166}{0.1} = 0.1 \qquad k_2 = \frac{0.225\text{-}0.195}{0.1} = 0.3$$

This implies that the expected value of the SPCU is

$$E(NPV_a) = 100 \times 1.07 \times \frac{90.88}{100.29} - 11.30 - 100 = -14.32$$

and the expected value of the Eurobond plus equity package is

$$E(NPV_b) = \frac{(1-.1)\,21.56}{2} - \frac{(1-.1)\,57}{2} = -15.95$$

Both of these expected cash flows represent the cost of an expected 0.45 Smurfit shares per unit at the exercise date. Then the net benefit of the SPCU over the alternative package is £1.63 for each £100 invested i.e.,

$$E(NPV_a) - E(NPV_b) = 1.63$$

NOTES

1. All references to pounds in this article are to Irish pounds.
2. $15\%\left(\frac{1.49}{1.394}\right)$
3. 1.49/1.394
4. 7.5 (1.49/1.394)
5. $V = \sum_{1=i}^{2d_1} CF_i \left(\frac{1 + r_{sp}}{1 + r_{fs}}\right)^i$

   where CF_i = the cash flow from the bond element in period i.
6. A full set of charts for different values of k_1 and k_2 is available from the authors.