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75 COMMON AND UNCOMMON ERRORS IN COMPANY VALUATION

Pablo Fernández *

* Professor of Financial Management, IESE

IESE Business School - Universidad de Navarra
Avda. Pearson, 21 - 08034 Barcelona. Tel.: (+34) 93 253 42 00 Fax: (+34) 93 253 43 43
Camino del Cerro del Águila, 3 (Ctra. de Castilla, km. 5,180) - 28023 Madrid. Tel.: (+34) 91 357 08 09 Fax: (+34) 91 357 29 13

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75 COMMON AND UNCOMMON ERRORS IN COMPANY VALUATION

Abstract

This paper contains a collection and a classification of 75 errors seen in company valuations performed by financial analysts, investment banks and financial consultants. The author had access to most of the valuations that are referred to in this paper when consulting in purchases, sales and mergers of companies, and in arbitrage processes. Some valuations are from public reports by financial analysts.

We classify the errors in six main categories:

1. Errors in the discount rate calculation and about the riskiness of the company
2. Errors when calculating or forecasting the expected cash flows
3. Errors in the calculation of the residual value
4. Inconsistencies and conceptual errors
5. Errors when interpreting the valuation
6. Organizational errors

JEL Classification: G12, G31, M21

Keywords: valuation, company valuation, valuation errors

75 COMMON AND UNCOMMON ERRORS IN COMPANY VALUATION

This paper contains detailed descriptions of 12 valuations and errors extracted from several others. The paper starts with the 12 valuations. Section 37.13 contains the classification of the 75 errors, providing at least one example of each.

The most common errors are the following:

1.B.1. Using the historical industry beta, or the average of the betas of similar companies, when it goes against common sense.
1.B.4. Using wrong formulas to lever and unlever the beta.
1.B.6. When valuing an acquisition, using the beta of the acquiring company.
1.C.1. Considering that the required market risk premium is equal to the historical equity risk premium.
1.D.2. Using a Debt to equity ratio to calculate the WACC different from the Debt to equity ratio resulting from the valuation.
1.D.5. Valuing all the different businesses of a diversified company using the same WACC.
1.D.7. Using the wrong formula for the WACC when the value of debt is not equal to its book value.
1.E.1. Discounting the tax shield using the cost of debt or the required return to unlevered equity.
1.F.1. Not considering the Country Risk, arguing that it is diversifiable.
2.A.2. Considering an increase in the company's cash position or financial investments as an equity cash flow.
2.A.3. Errors in the calculation of the taxes affecting the FCF.
2.A.4. Considering that Expected Equity Cash flows are not equal to expected dividends plus other payments to shareholders (share repurchases…).
2.B.1. Wrong treatment of seasonal working capital requirements.
2.B.2. Wrong treatment of stocks that are cash equivalent.
2.C.1. Forgetting balance sheet accounts that affect the cash flows.
2.D. Exaggerated optimism when forecasting the cash flows.
3.A. Inconsistent Cash flow used to calculate the residual value.
3.D. Using arithmetic averages instead of geometric averages to assess growth.
4.A.1. Considering the cash in the company as an equity cash flow when the company will not distribute it.
4.A.2. Using real cash flows and nominal discount rates, or vice versa.
4.B.1. Using the average of multiples extracted from transactions executed over a very long period of time.
4.B.2. Using the average of transactions multiples that have a wide dispersion.
4.C.2. Considering that Equity value or Enterprise Value do not satisfy the time consistency formulas.

4.D.3. Considering that the value of debt is equal to its book value, when the two are different.
4.D.5. Including the value of real options that have no economic meaning.
4.D.9. Wrong concept of the optimal capital structure.
4.D.11. Making assumptions about future sales, margins, etc. that are inconsistent with the economic environment, industry perspectives, or competitive analysis.
4.D.12. Considering that ROE is the return to shareholders of non-traded companies.
5.A. Confusing Value with Price.
5.D. Assuming that a Company has equal value to all buyers.
5.F. Considering that goodwill includes brand value and intellectual capital.
6.B. Assigning a valuation to an investment bank and not having any involvement in it.

The outline of the paper is as follows:

37.1. Wrong calculation of residual value and wrong treatment of cash
37.2. WACC inconsistent with evolution of Equity and Debt Values
37.3. Multiple errors of an ad hoc method
37.4. Errors in the definition of the discount rate, and in using real cash flows and nominal discount rates
37.5. Errors using Transaction Multiples of different years and with a wide dispersion
37.6. Error of using historical betas
37.7. Valuation using multiples wrongly
37.8. Forecasting growth wrong: arithmetic vs. geometric rates
37.9. Overoptimism
37.10. Valuation of a communications technology company in an arbitration process
37.11. Valuation of Internet companies using esoteric multiples
37.12. Cost of capital in emerging countries, illiquidity premium and small caps premium
37.13. A classification of the errors
    1. Errors in the discount rate calculation and about the riskiness of the company
    2. Errors when calculating or forecasting expected cash flows
    3. Errors in the calculation of the residual value
    4. Inconsistencies and conceptual errors
    5. Errors when interpreting the valuation
    6. Organizational errors

Appendix 1. List of the 75 errors
Bibliography

37.1. Wrong calculation of the residual value and wrong treatment of cash

This section reports the valuation of a manufacturing company performed by a financial consulting firm.

Table 37.1 shows a valuation performed by discounting expected free cash flows at the WACC rate of 12%. Lines 1 to 5 contain the calculation of the free cash flows. NOPAT (Net Operating Profit After Taxes) does not include interest expenses. The residual value in 2007 is calculated assuming a residual growth of 2.5%:

Residual value in 2007 = 12,699 = 1,177 x 1.025 / (0.12 – 0.025).

The enterprise value (line 9) is the sum of the present value of the free cash flows 2003-2007 (line 7) plus the present value of the terminal value (line 8). Adding cash (line 10) and subtracting debt value (line 11), the financial consulting firm calculates the equity value (line 12) as $6,561 millions. The valuation may sound all right, but it contains two errors.

Table 37.1. Valuation of a manufacturing company performed by a financial consulting firm

line	$million	**2003**	**2004**	**2005**	**2006**	**2007**
1	Net Operating Profit After Taxes	500	522	533	574	616
2	Depreciation	1,125	1,197	1,270	1,306	1,342
3	Capital expenditures	–1,445	–722	–722	–361	–361
4	Investment in working capital	203	–450	–314	–399	–420
5	Free cash flow	383	547	767	1,120	1,177
6	Residual value in 2007 (WACC 12% and residual growth 2.5%)	12,699				

Present value in 2002 of free cash flows (WACC = 12%)

7	2003-2007	2,704
8	Residual value in 2007	7,206
9	Total EV (Enterprise Value)	9,909
10	Plus cash	280
11	Minus debt	–3,628
12	Equity value	6,561

Errors in the valuation

1. It is inconsistent to use the FCF of 2007 to calculate the residual value. The reason for this is that in 2007 the forecasted capital expenditures (361) are smaller than the forecasted depreciation (1342). It is wrong to assume that this will continue into the future indefinitely. As Table 37.2 shows, net fixed assets would be negative in 2010.

Table 37.2. Expected net fixed assets according to the assumptions

	2002	**2007**	**2008**	**2009**	**2010**	**2011**
Gross fixed assets	12,527	16,138	16,508	16,887	17,276	17,675
Cum. Depreciation	7,628	13,868	15,244	16,653	18,099	19,580
Net fixed assets	4,899	2,270	1,264	234	–823	–1,905

The normative 2007 FCF used to calculate the residual value should be $196 million (assuming capital expenditures equal to depreciation) or less (if we assume that the net fixed assets also grow at 2.5%). Correcting this error in the valuation, Table 37.3 shows that the equity value is reduced to $556 million (instead of $6,561 million).

Table 37.3. Valuation of the manufacturing company from Table 37.1 adjusting the normative free cash flow and the residual value

	Normative 2007 FCF	196	
6	Residual value in 2007	2,115	= 196 x 1.025 / (0.12 - 0.025)

Present value in 2002 of free cash flows:

7	2003-2007	2,704
8	Residual value in 2007	1,200
9	Total EV (Enterprise Value)	3,904
10	Plus cash	280
11	Minus debt	–3,628
12	Equity value	556

Of course, in any given year, or in various years, capital expenditures may be lower than depreciation, but it is not consistent to consider this in the regular cash flow used to calculate the residual value as a growing perpetuity.

2. On line 10, the valuators add the cash ($280 million) to calculate the equity value. It is wrong to add all the cash because:

    1. The company needs some cash to continue its operations, and
    2. It is not expected to distribute the cash immediately

    It will be correct to add the cash only if:

    – The interest received on the cash is equal to the interest paid on the debt, or
    – The cash will be distributed immediately, or
    – The cost of debt used to calculate the WACC is the weighted average of the cost of debt and the interest received on the cash holdings. In this case, the debt used to calculate the debt to equity ratio must be debt minus cash. The cash increases must be included in the "Investments in working capital".

The value of the excess cash (cash on top of the minimum cash needed to continue operations) is lower than its book value if the interest received on the cash is lower than the interest paid on the debt. The company increases its value by distributing the excess cash to shareholders or by using the excess cash to reduce its debt, rather than keeping it.

37.2. WACC inconsistent with the evolution of Equity and Debt Values

Table 37.4 contains the valuation of a Broadcasting Company, performed by an investment bank, discounting the expected FCFs at the WACC (10%) and assuming a

constant growth of 2% after 2008. The valuation provided lines 1 to 7, and stated that the WACC was calculated assuming a constant Ke of 13.3% (line 5) and a constant Kd of 9% (line 6). The WACC was calculated using market values (the equity market value at the valuation date was 1,490 million and the debt value 1,184) and the statutory corporate tax rate of 35%.

The valuation also included the Equity value at the end of 2002 (3,033; line 8) and the debt value at the end of 2002 (1,184; line 10). Table 37.5 provides the main results of the valuation.

Errors in the valuation

1. Wrong calculation of the WACC. To calculate the WACC, we need to know the evolution of the Equity value and of the Debt. We calculate the Equity value based on the equity value provided for 2002. The formula that relates the equity value in one year with the equity value in the previous year is Et = Et–1 (1+Ket) – ECFt.

   To calculate the debt value, we may use the formula for the increase of debt that appears on line 9. The increase of debt may be calculated if we know the ECF, the FCF, the interest and the effective tax rate. With line 10, it is easy to fill line 10.

   Line 11 shows the debt ratio according to the valuation, which decreases with time.

   If we calculate the WACC using lines 4, 5, 6, 8 and 10, we get line 12. The calculated WACC is higher than the WACC assumed and used by the valuator!

   Another way of showing the inconsistency of the WACC is to calculate the implicit Ke in a WACC of 10% using lines 4, 6, 8 and 10. This is shown in line 13. Ke should be much lower than 13.3% for using a WACC of 10%.

2. It is not valid to use the capital structure of 2008 to calculate the residual value because to calculate the present value of the FCF growing at 2% using a single rate there has to be a constant debt to equity ratio.

Table 37.4. Valuation of a Broadcasting Company performed by an investment bank

Data provided by the investment bank in italics.

		2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
1	FCF		*–290*	*–102*	*250*	*354*	*459*	*496*
2	ECF		*0*	*0*	*0*	*0*	*34*	*35*
3	Interest expenses		*107*	*142*	*164*	*157*	*139*	*112*
4	Effective tax rate		*0.0%*	*0.0%*	*0.0%*	*0.0%*	*12.0%*	*35.0%*
5	Ke		*13.3%*	*13.3%*	*13.3%*	*13.3%*	*13.3%*	*13.3%*
6	Kd		*9.0%*	*9.0%*	*9.0%*	*9.0%*	*9.0%*	*9.0%*
7	WACC used in the valuation		*10.0%*	*10.0%*	*10.0%*	*10.0%*	*10.0%*	*10.0%*
8	Equity value (E)	3,033	3,436	3,893	4,410	4,997	5,627	6,341
9	ΔD = ECF – FCF + Int (1-T)		397	244	–86	–197	–303	–389
10	Debt value (D)	1,184	1,581	1,825	1,739	1,542	1,239	850
11	D/(D+E)	28.1%	31.5%	31.9%	28.3%	23.6%	18.0%	11.8%

12	WACC using lines 4,5,6,8,10	12.09%	11.95%	11.93%	12.08%	12.03%	11.96%
13	Implicit Ke in a WACC of 10%	10.39%	10.46%	10.47%	10.39%	10.64%	10.91%

Table 37.5. Valuation using the wrong WACC of 10%

Present value in 2002 using a WACC of 10%	
Present value in 2002 of the free cash flows 2003-2008	647
Present value in 2002 of the residual value (g=2%)	3,570
Sum	4,217
Minus debt	–1,184
Equity value	3,033

To perform a correct valuation, assuming a constant WACC from 2009 on, we must recalculate Table 37.4. Tables 37.6 and 37.7 contain the valuation correcting the WACC. To assume a constant WACC from 2009 on, it is necessary that the debt also increases 2% per year (see line 9, 2009). It implies that the ECF (line 2) in 2009 is much higher than the ECF of 2008.

Just by correcting the error in the WACC, the equity value is reduced from 3,033 to 2,014 (a 33.6% reduction).

Table 37.6. Valuation calculating the WACC correctly

		2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
1	FCF		–290	–102	250	354	459	496	505.9
2	ECF		0	0	0	0	34	35	473.2
3	Interest expenses		107	142	164	157	139	112	76.5
4	Effective tax rate		0.0%	0.0%	0.0%	0.0%	12.0%	35.0%	35.0%
5	Ke		13.3%	13.3%	13.3%	13.3%	13.3%	13.3%	13.3%
6	Kd		9.0%	9.0%	9.0%	9.0%	9.0%	9.0%	9.0%
8	Equity value (E)	2,014	2,282	2,586	2,930	3,320	3,727	4,187	4,271
9	ΔD = ECF – FCF + Int (1-T)		397	244	–86	–197	–303	–389	17
10	Debt value (D)	1,184	1,581	1,825	1,739	1,542	1,239	850	867
11	D/(D+E)	37.0%	40.9%	41.4%	37.2%	31.7%	25.0%	16.9%	16.9%
12	WACC calculated with 4,5,6,8,10		11.71%	11.54%	11.52%	11.70%	11.59%	11.44%	12.04%

Table 37.7. Valuation using the corrected WACC of Table 37.6

Present value in 2002 using the WACC calculated in Table 37.6	
Present value in 2002 of the free cash flows 2003-2008	588
Present value in 2002 of the residual value (g=2%)	2,610
Sum	3,198
Minus debt	–1,184
Equity value	2,014

37.3. Multiple errors of an ad hoc method

The following is a summary of the valuation of a south European Pepsi-Cola franchise (bottling plant and distribution company) made by a financial consulting firm. "The term 'value of the shares' is defined as the estimated fair purchase or sale value for a free buyer and a free seller, both of whom are aware of all the relevant legal documents and neither of whom is acting under any kind of duress."

Table 37.8 shows the company's balance sheets and P&L, actual and as forecast by the financial consulting firm. Table 37.9 shows the valuation of the shares at 21.6 million Euros. This figure is obtained by first calculating the expected free cash flows (lines 1-4). Line 5 calculates the present value of the free cash flows 1990-1994 at 17.48%, which gives 6.3 million Euros. Line 6 is the present value of the residual value calculated in lines 11-16. From the resulting value of the firm the debt is deducted and the value of the investments is added to arrive at the figure of 21.6 million Euros as the value of the shares.

Table 37.8. Balance sheets and P&L of BottlingSouth (million euros)

	Actual						Forecast				
	1984	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**
Sales	10.52	13.38	14.88	19.40	20.97	23.33	25.96	27.79	29.90	32.32	34.79
Net income	0.89	1.50	1.69	2.15	1.49	1.35	1.83	2.27	2.82	3.65	4.22

Balance sheet	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**
Net fixed assets	4.04	5.02	5.87	7.46	9.88	11.63	12.31	13.04	13.84	14.70	15.60
WCR	1.17	1.81	2.25	3.34	3.95	4.68	5.19	6.11	7.18	9.05	10.69
Total assets	5.20	6.83	8.12	10.80	13.83	16.31	17.50	19.15	21.01	23.75	26.29
Financial Debt	1.28	1.60	1.54	2.40	4.13	5.55	5.55	5.55	5.55	5.55	5.55
Net worth	3.92	5.24	6.58	8.40	9.70	10.76	11.95	13.60	15.46	18.20	20.74

The risk-free interest rate at the time of the valuation was 13.3% and the year-on-year inflation rate was 6.9%. Expected inflation was 5%.

This valuation contains at least five mistakes.

Table 37.9. Valuation of the shares of BottlingSouth (million euros)

		1990	**1991**	**1992**	**1993**	**1994**
1	Net income	1.83	2.27	2.82	3.65	4.22
2	+ depreciation	0.26	0.25	0.23	0.21	0.23
3	– investments in fixed assets	0.93	0.98	1.03	1.08	1.13
4	= FREE CASH FLOW	1.15	1.54	2.02	2.78	3.32
5	Present value of Free cash flows at 17.48%	6.3				
6	Present value of the residual value at 12.2%	19.8	= 35.3 / $(1{,}122)^5$			
7	Enterprise Value	26.1				
8	– Financial Debt	–5.6				
9	+ Value of financial investments	1.0				
10	Equity value	21.6				

Residual value

11	Market value of Fixed assets in 1989	17.43
12	+ New investments in Fixed assets in 1990-1994	5.1
13	– Loss in the value of Fixed assets in 1990-1994	–3.00
14	+ Working Capital Requirements in 1994	10.7
15	= Substantial value in 1994	30.3
16	Enterprise value in 1994	35.3

= 30.3 + 3.587 x (4.22 – 30.3 x 0.0933)

3.587 = Present value of 1 euro for 5 years, discounted at 12.2%

9.33% = Return on assets. 4.22 = expected net income in 1994

Errors:

1. Free cash flow calculation. The free cash flow is miscalculated because it includes interest (part of net income) and does not include the increases in WCR. Table 37.10 shows the impact of these two corrections on the free cash flow.

Table 37.10. Corrections to the Free Cash Flow calculation of Table 37.9.

	1990	**1991**	**1992**	**1993**	**1994**
Wrong Free Cash Flow (line 4 of Table 37.9)	1.15	1.54	2.02	2.78	3.32
– Increase in Working Capital Requirements	0.51	0.92	1.06	1.87	1.64
+ Interest expenses x (1 - 35%)	0.54	0.54	0.54	0.54	0.54
Corrected Free Cash Flow	1.18	1.16	1.50	1.45	2.22

2. The free cash flow of the years 1990-1994 is discounted at a higher rate (17.48%) than the residual value in 1994 (12.25%).

3. The discount rate used for the residual value in 1994 (12.25%) is lower than the risk-free rate (13.3%).

4. The calculation of the residual value is very curious, but wrong. If we calculate the residual value as a perpetuity that grows at a rate g based on the corrected free cash flow for 1994 (2.22), we get a rate of growth of 10.5%. Obviously, this is absurd:

Residual value = 35.3 = 2.22 (1+g)/(0.1748-g). g = 10.5%

5. Overoptimistic net income and cash flow forecasts. One way to see just how overoptimistic they are is to compare the growth of the dividends the company actually paid out over the period 1984-1989 with the dividend forecasts implicit in Table 37.9 (see Table 37.11). Over the previous 5 years dividends had grown from 0.22 million to 0.3 million, whereas over the next 5 years they were projected to grow from 0.3 million to 1.68 million. And let's not forget that this is a soft drinks company operating in a very mature industry.

Table 37.11. Dividends paid until 1989 and implicit dividends in the projections of Table 37.9

(million euros)	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Dividends	0.22	0.18	0.35	0.32	0.19	0.30	0.64	0.62	0.96	0.91	1.68

What happened?

The consulting firm that produced the valuation was asked to manage the sale at the price of 21.6 million, but they replied that they only did valuations. In the end, after various long-drawn-out negotiations, the company's shares were eventually sold for 5 million euros. Note that this is not such a small amount: it assumes, if the dividends are discounted at 20%, that the 1989 dividends will grow indefinitely at 13.2%. 5 = 0.3 x 1.132 /(0.2 – 0.132).

Table 37.12 shows the company's net income after the valuation. Note the big difference between these figures and the forecasts in Table 37.8.

Table 37.12. Net income of BottlingSouth after the Valuation (million euros)

	1990	1991	1992	1993	1994	1995	1996	1997
Net income	1.08	1.30	0.59	0.64	1.30	1.08	0.59	1.20

37.4. Errors in the definition of the discount rate, and in using real cash flows and nominal discount rates

Valuation of Cereol Ukraine provided by a major European investment bank and dated April 2001. "The weighted average cost of capital (WACC) is defined as:

$$\text{CMPC (WACC)} = R_f + ßu\ (Rm - R_f), \qquad [1]$$

where: R_f = risk-free rate; ßu = unlevered beta; Rm = market risk rate."

The WACC calculated for Cereol Ukraine was 14.6% and the expected free cash flows (in real terms, that is, excluding inflation) for Cereol Ukraine were:

(Million euros)	2001	2002	2003	2004	2005	2006	2007	2008	2009
FCF	3.7	14.7	11.9	–3.0	12.9	12.9	12.6	12.6	12.6

The reported enterprise value in December 2000 was 71 million euros. This result comes from adding the present value of the 2001-2009 FCFs (45.6) discounted at 14.6% plus the present value of the residual value calculated with the FCF of 2009 assuming no growth (25.3).

Errors in the valuation

1. *Wrong definition of WACC*. In fact, [1] is not at all the definition of the WACC. This formula is the definition of the required return to assets, also called cost of unlevered equity (Ku). We also must interpret the term (Rm – Rf) as the expected risk premium.

   The correct formula for the WACC is:

   $$\text{WACC} = [D / (D+E)]\ Kd\ (1– T) + [E / (D+E)]\ Ke \qquad [2]$$

   $$\text{where: } Ke = Ku + (D / E)\ (1-T)\ (Ku - Kd) \qquad [3]$$

   Kd = Cost of debt. D = Value of debt. E = Value of equity. T = corporate effective tax rate

This valuation used for Cereol Ukraine a "WACC" (according to the wrong definition) of 14.6%. But 14.6% was the Ku, not the WACC. 71 million euros should have been the Value of the unlevered equity, not the enterprise value.

On December 2000, Debt for Cereol Ukraine was 33.7 million euros and the nominal cost of debt was 6.49%.

The correct WACC for Cereol Ukraine should have been (1):

Ke = Ku + (D / E) (1-T) (Ku – Kd)= 14.6 + (33.7/48.63) (1-0.3)(14.6-6.49) = 18.53%
WACC = [D / (D+E)] Kd (1 – T) + [E / (D+E)] Ke = 0.409 x 6.49 (1-0.30) + 0.591 x 18.53 = 12.81%
Enterprise value = E+D = PV(FCF;12.81%) = 82.33 million euros

2. *Real vs. nominal cash flows and discount rates*. This valuation has another error: the FCFs are in real terms, that is, excluding inflation (that is why free cash flows are constant from 2007-2009 and lower than in previous years), while Ku (14.6%) is calculated in nominal terms, that is, including inflation.

   For a correct valuation the cash flows and the discount rate used must be coherent. This means that:

   – Cash flows in real terms must be discounted with real discount rates, and
   – Cash flows in nominal terms must be discounted with nominal discount rates.

   The correct way is either to increase cash flows by inflation or to deduct inflation from nominal discount rates. In fact, for real (constant) cash flows, such as the ones that this valuation uses, we must use real WACC and real Ku:

   Real WACC = (1 + Nominal WACC)/(1 + expected inflation) – 1
   Real Ku = (1 + Nominal Ku)/(1 + expected inflation) – 1

   If we had discounted inflation expectations in the long run of 3%, this would have resulted in a Real Ku of 11.26%.

   On December 2000, Debt for Cereol Ukraine was 33.7 million euros and the nominal cost of debt was 6.49%. Therefore, the real cost of debt was 3.39%.

   Performing a consistent valuation of the real free cash flows, using real discount rates, we get:

   Ke = Ku + (D / E) (1 – T) (Ku – Kd) = 11.26 + (33.7/72.81) (1 – 0.3)(11.26 – 3.39) = 13.8%
   WACC = [D / (D + E)] Kd (1 – T) + [E / (D + E)] Ke = 0.3164 x 3.39 (1 – 0.30) + 0.6836 x 13.8 = 10.19%
   Enterprise value = E + D = PV(FCF;10.19%) = 106.51 million euros

   Thus, using the same assumptions as the Investment Bank, but correcting the two manifest errors, the enterprise value was 106.51 million euros instead of 71 (plus 50%).

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(1) Remember that the (D/E) ratios must be calculated using the values obtained in the valuation.

37.5. Errors using Transaction Multiples of different years and with a wide dispersion

An investment bank did this valuation in January 2003. "Table 37.13 shows the multiples of recent transactions. We use the median of these multiples (6.8), as the median eliminates extremes."

Table 37.13. Transaction multiples in the oil business

Acquirer/Target	**Date**	EV/EBITDA	EV/EBIT
Bunge/Cereol	November 2002	6.3x	9.6x
Cargill/Cerestar	October 2001	12.1x	na
Land O'Lakes/Purina Mills	June 2001	4.0x	8.2x
Primor Inversiones/Mavesa	January 2001	7.5x	10.3x
Corn Product International/Arcancia CPC	October 1998	7.3x	na
Eridania Béghin-Say/American Maize products	February 1995	5.5x	8.3x
	Average	7.1x	9.1x
	Median	6.8x	9.0x

Errors

1. Multiples of different years. The multiples come from a very long period of time: from February 1995 to November 2002.

2. Dispersion of the multiples. The EV/EBITDA ranges between 4 and 12.1. Why should 6.8 (the median) be a reasonable multiple?

37.6. Error of using historical betas

The following report comes from a financial consulting firm:

> "The purpose of our study has been to make a professional estimate of the fair value at 31 December 2001 of the shares of INMOSEV, an unlisted real estate firm whose main business consists of buying land and building houses for resale. We have assumed a capital contribution by a third party in the amount of 30 million euros in the year 2002, with an estimated return on its investment of 20%; that is, 6 million euros.
>
> "Our study is based essentially on information provided to us by INMOSEV, consisting of historical data and on assumptions and hypotheses about estimated future income over the next 11 years (2002-2012)."

Table 37.14. Main magnitudes of the INMOSEV valuation

	Equity cash flow (ECF)	ßu	Ku	ßL	Ke	Present value of ECF
2001	0	0.27	6.22%			0
2002	–30,000	0.27	6.22%	0.45	7.04%	–28,026
2003	0	0.27	6.22%	0.42	6.91%	0
2004	0	0.27	6.22%	0.5	7.26%	0
2005	0	0.27	6.22%	0.52	7.35%	0
2006	0	0.27	6.22%	0.53	7.37%	0
2007	0	0.27	6.22%	0.57	7.55%	0
2008	5,631	0.27	6.22%	0.59	7.67%	3,437
2009	6,401	0.27	6.22%	0.56	7.54%	3,633
2010	7,184	0.27	6.22%	0.54	7.43%	3,796
2011	7,963	0.27	6.22%	0.52	7.32%	3,920
2012	20,501	0.27	6.22%	0.49	7.23%	9,412
Present value of cash flows from 2013 onward					152,913	
					Sum	149,085

From this total we must deduct the margin that the new shareholder who contributes the 30 million euros will earn on the deal (we estimate a figure of around 6 million).

"Table 37.14 shows the equity cash flows that have been used in this study. The main assumptions and estimates made in applying the valuation method mentioned above are as follows:

Growth rate of the equity cash flows from 2012 = 1%.
Discount rate. The cost of equity corresponds to the return on long-term risk-free assets, plus the market risk premium, multiplied by a coefficient called beta:
Return on Spanish 15-year government bonds (risk-free return) = 5.00%
Market risk premium = 4.50% (Source: BNP Paribas, SCH)
Unlevered beta (ßu) = 0.27. Average of the unlevered betas of listed companies in Spain (see Table 37.15)
Levered beta (ßL) according to INMOSEV's (average) capital structure = 0.50
The average cost of equity is 7.25%.

Consequently, the value of INMOSEV's shares at 31 December 2001 is on the order of approximately 143.09 million euros."

Table 37.15. Betas of listed real estate firms in Spain

	Vallehermoso	**Colonial**	**Metrovacesa**	**Bami**	**Urbis average**
Levered beta	0.49	0.12	0.38	0.67	0.42 0.42
Unlevered beta	0.29	0.11	0.27	0.39	0.28 0.27

Source: Average of the unlevered betas, provided by SCH, of the real estate companies Vallehermoso, Colonial, Metrovacesa, Bami and Urbis.

Error

Arbitrary use of betas from a regression of historical data. The resulting beta (unlevered beta = 0.27) is so small that it makes no sense to use it to value any company, let alone an unlisted one. Also, these betas (and any others that might have been used) are

arbitrary, as Table 37.16 shows. If we calculate the betas of the five companies on 31 December 2001 using daily and monthly data and different periods, we can obtain average unlevered betas ranging anywhere from 0.22 to 0.85. Obviously, having a valuation depend on such a shifting and unreliable variable is contrary to all common sense and prudence.

37.16. Betas calculated at 31 December 2001, with respect to the Madrid Stock Exchange General Index, using daily and monthly data for different periods prior to 31/12/2001

		Beta at 31/12/2001					
Period	**Data**	**Vallehermoso**	**Colonial**	**Metrovacesa**	**Bami**	**Urbis**	**Average**
5 years	Daily	0.70		0.46	0.67	0.58	0.60
	Monthly	0.71		0.45	1.25	1.00	0.85
4 years	Daily	0.67		0.41	0.63	0.59	0.58
	Monthly	0.58		0.43	0.95	0.80	0.69
3 years	Daily	0.60		0.31	0.51	0.48	0.48
	Monthly	0.41		0.17	0.59	0.42	0.40
2 years	Daily	0.42	0.15	0.19	0.27	0.25	0.26
	Monthly	0.68	0.28	0.50	0.85	0.67	0.60
1 year	Daily	0.37	0.18	0.18	0.19	0.27	0.24
	Monthly	0.59	0.41	0.46	0.32	0.78	0.51
6 months	Daily	0.31	0.23	0.22	0.09	0.25	0.22
	Monthly	0.81	0.72	0.68	0.39	0.80	0.68
	Maximum	0.81	0.72	0.68	1.25	1.00	0.85
	Minimum	0.31	0.15	0.17	0.09	0.25	0.22

In the end, the shares were sold for 70.4 million euros (instead of 143 million). This is the figure obtained by discounting the flows shown in Table 37.14 at 9.8% (rather than at 7.26%).

37.7. Valuation using multiples wrongly

Table 37.17 shows a valuation performed by a well-recognized investment bank using the Price-earnings ratio. The valuation has a major error.

Table 37.17. Valuation using the Price-earnings ratio

1	Expected net income of next year	28.6 $ millions	
	Valuation using PER	**Minimum**	**Maximum**
2	PER assumed	9.0	10.0
3	PER x net income	257.4	286.0
4	Plus: excess cash	93.1	93.1
5	Minus: Financial debt	115.6	115.6
6	Minus: Retirement commitments	34.5	34.5
7	Equity value	200.4	229.0

Error. The Price-earnings ratio is equal to Equity value divided by net income. It is not correct to substract the debt (line 5). The correct equity value (according to the assumptions) should be 115.6 millions higher than line 7.

To add the excess cash (line 4) is correct in this case because the buyer planned to distribute the excess cash to the shareholders immediately.

37.8. Forecasting the growth wrongly: arithmetic vs. geometric rates

Table 37.18 shows the past evolution of the EBITDA of an industrial company operating in a mature industry. The investment bank that performed the valuation used Table 37.18 as the justification of a forecasted average annual increase of EBITDA of 6%. It is obvious that the geometric average is a much better indicator of the past average growth.

Table 37.18. Arithmetic vs. geometric growth

	1995	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
EBITDA	127	132	149	91	150	132	146	147
Annual growth		3.9%	12.9%	–38.9%	64.8%	–12.0%	10.6%	0.7%
Arithmetic average 1995-2002	6.0%							
Geometric average 1995-2002	2.1%							

37.9. Overoptimism

The share price on July 12, 2001 was $49. The following lines are extracted from a Valuation report about Enron Corp. produced by a recognized investment bank on July 12, 2001.

"*We view Enron as one of the best companies in the economy*. There are still several misconceptions about Enron that mask the company's strong fundamentals. We therefore hosted an investor conference call on June 27 to clarify Enron's growth prospects and answer investors' questions.

"*We expect Enron shares to rebound sharply in the coming months*. We believe that Enron shares have found their lows and will recover significantly as investor confidence in the company returns and as misconceptions about Enron dissipate. We strongly reiterate our Buy rating on the stock with a $68 price target over the next 12 months.

"*Enron is a world-class company, in our view*. We view Enron as one of the best companies in the economy, let alone among our group of diversified natural gas companies. We are confident in the company's ability to grow earnings 25% annually for the next five to ten years, despite its already large base. We believe that Enron investors have the unique opportunity to invest in a high growth company with improving fundamentals.

"Valuation. Enron stock is trading at 21.8x our $2.25 2002 EPS estimate. The universe of more than $20-billion market capitalization companies in the S&P 500 with greater than 20% forecast long-term growth trades at an average 1.4X PEG ratio. In this list of 25 companies, very few trade at less than 1X PEG, while Enron trades at 0.9X. We have established a 12-month price target of $68, representing 40% appreciation, based on a 1.2X PEG ratio. Our 25% long-term earnings growth rate is significantly higher than the 16% (First Call) and 17% (Baseline) growth estimates. We believe that this difference represents the opportunity in the shares as our forecasts become more generally embraced by investors. Our sum-of-parts analysis further reinforces our $68 valuation. Based on our DCF analysis, we value Enron Energy Services at $15 per share. We have placed a conservative 28.5X and 13X 2002 P/E multiple on the high growth wholesale business and the pipeline/PG&E businesses, respectively, to arrive at a combined (including EES and assuming zero value from communications) $68 price target. We strongly reiterate our Buy rating on the stock with a $68 price target over the next 12 months.

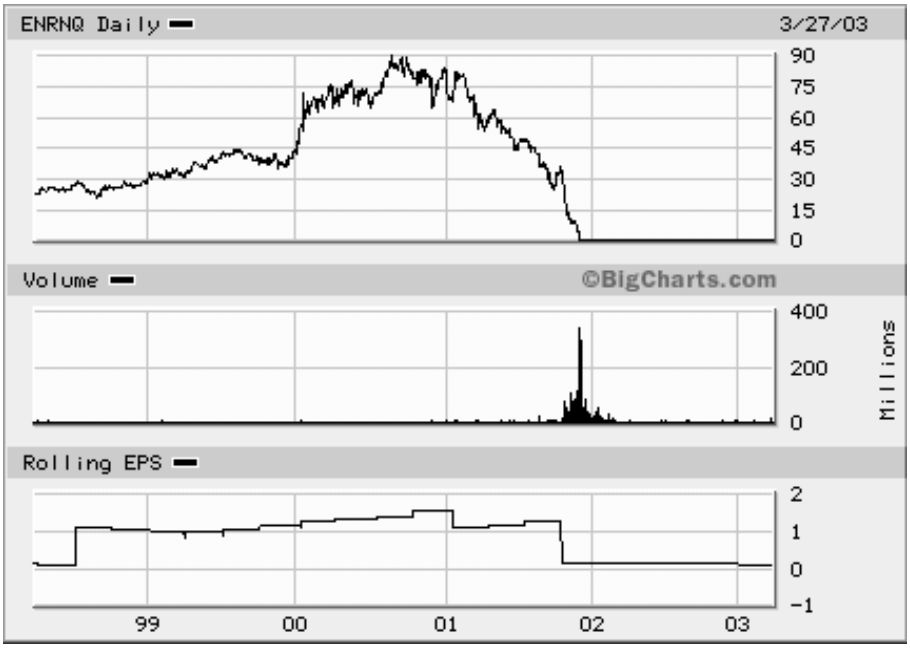
Enron earning model, 1994-2005E. US$ millions except per-share data

	1994	1995	1996	1997	1998	1999	2000	2001E	2002E	2003E	2004E	2005E
Net income	438	504	568	88	686	827	896	1,563	1,939	2,536	3,348	4,376
Adjusted EPS	0.83	0.91	0.91	0.87	1.00	1.18	1.47	1.85	2.25	2.75	3.52	4.47
Dividends per share	0.38	0.41	0.43	0.46	0.48	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Book value per share	5.15	5.65	6.64	9.27	9.95	12.28	13.94	15.47	17.99	21.02	24.79	29.47

"*Financials*. We recently raised our 2001 EPS estimate $0.05 to $1.85 and established a well-above consensus 2002 estimate of $2.25. We are confident in the company's ability to grow earnings 25% annually for the next five to ten years, despite its already large base."

Figure 37.1 shows the well-known evolution of the share price of Enron.

Figure 37.1 Share price, earnings per share and volume of Enron



37.10. Valuation of a communications technology company in an arbitration process

Luis Cuadrado, owner of Telecosin, S.A. (a telecommunications and information systems company), sold 5% of his company's shares on 20 October 1998 to Company AAA for 36,000 euros. He also sold an option to purchase 44% of Telecosin's share capital for 535,000 euros. AAA paid 18,000 euros for the option. AAA could exercise the option at any time between ten business days after the signing of the agreement and 31 December 2000.

Both sales were set in the context of an industrial agreement between AAA and Telecosin in which the two companies undertook to "make every effort to develop to the maximum the marketing and manufacturing of complementary products for their systems, through full cooperation in the use of the necessary technological and human resources". The agreement contained a number of covenants and concluded with the provision that "non-

performance by either partner of the above-stated covenants shall entail the obligation to pay compensation in the amount of 2.4 million euros to the remaining shareholders".

The parties to the agreement formally accepted that "any litigation, dispute, question or claim arising out of the execution or interpretation of this agreement shall be resolved by the binding decision of the Court of Arbitration of (a Spanish city)". They also agreed that "in the event that the option is exercised by AAA within the prescribed term and Mr. Cuadrado fails to fulfill his obligation to sell said shares, Mr. Cuadrado shall return to AAA the amount paid as the price of the option (18,000 euros), without prejudice to any complementary claims for compensation that may arise".

Table 37.19 shows the balance sheets and P&L of Telecosin.

Table 37.19. Balance sheets and P&L of Telecosin, 1995-2000 (Thousand euros)

(Thousand euros)	1995	1996	1997	1998	1999	2000
Sales	336	768	1,009	1,848	2,746	6,815
Net income	15	8	11	98	156	87
Dividends	0	0	0	0	0	0
Cash and banks	33	13	53	426	421	82
Accounts receivable	119	201	211	635	779	3,372
Inventories	0	73	20	42	150	141
Net fixed assets	59	53	50	158	235	804
Total assets	212	340	334	1,261	1,586	4,400
Short-term financial debt	0	0	2	2	0	1,124
Trade creditors	100	233	102	212	204	1,619
Other creditors	47	36	146	340	558	798
Long-term bank debt	0	0	0	405	367	314
Shareholders' equity	64	72	83	301	457	545
Total liabilities	212	340	334	1,261	1,586	4,400
Employees at 31 December	11	15	21	41	51	101

In September 2000, AAA announced its wish to exercise the option, but Luis Cuadrado refused to sell, alleging that AAA had not met its obligations under the industrial agreement of which the option was a part, and that, furthermore, AAA had been dissolved (2). In October 2000, AAA took its case to the Court of Arbitration. The following section gives a summary of the valuation that AAA submitted to the court.

37.10.1. Valuation of Telecosin submitted by AAA

"The legitimacy of the comparable transactions method is based on the fact that financial analysts working for merchant banks, consulting firms and financial companies for valuing companies like Telecosin widely and predominantly use this method and the revenue parameter.

(2) The General Meeting of 29-6-99 passed a resolution enacting the dissolution of AAA, SA., "which is hereby dissolved without liquidation, by means of the transfer of all of its assets to 3 beneficiary companies, one already in existence, SIIP Consulting SL., and two newly created, whose names shall be SAAP SL., and AAA, S.A."

"In September last year a group of investors consisting of Dresdner Kleinwort Benson, MCH and Sibec acquired 20% of the company IP Sistemas for 3.6 million euros. This implies that 100% of the company was valued at 18 million euros.

"IP Sistemas has many features in common with Telecosin, making it a suitable point of comparison for determining the value of Telecosin. There are, however, two differences in Telecosin's favour that need to be mentioned: long experience in the market (which implies more consolidated goodwill and greater recognition by customers), and a significantly larger workforce. The following table offers a comparison of the two companies:

	IP SISTEMAS	Telecosin
Turnover 99	0.9 million euros (1 month)	2.75 million euros
Turnover 2000	10.4 million euros	6.81 million euros
Workforce	63 people	110 people
Founded in	1999	1994

"In 1999 IP Sistemas had a turnover of 0.9 million euros. However, the company had only started trading in November. If we extrapolate this turnover to the year as a whole, we get an annual turnover of 5.4 million. Therefore, the growth in IP Sistemas's turnover in the period 1999-2000 is 90%, lower than that of Telecosin in the same period (146%) (3).

"The IP Sistemas investors valued the company with reference to the sales figure for the current year (2000), using a sales multiple of 1.7. If this same multiple (1.7) is applied to Telecosin's minimum forecasted sales for 2001 (16.8 million euros), the value of the company is 28.6 million.

"There are two listed international companies whose business activities are very similar to those of Telecosin: CMG and Lógica. The capitalization-to-sales ratios of these firms hover around an average of 6. However, following established practice in the investment community, when valuing unlisted companies we apply a discount of 30% to the parameters of listed companies in recognition of the value attributable to share liquidity. If we apply this discount to Telecosin, we obtain an historical sales multiple of 4.2, which, when multiplied by 6.8 million, gives us a figure very close to the valuation obtained by comparison with the proven value of IP Sistemas (28.6 million).

"We consider that the price at which a third-party buyer, in good faith and with sufficient access to relevant information about the company, would be willing to pay for an ownership interest in the share capital of Telecosin would be 28.6 million (price based on 100% of the company's capital).

"It is our opinion that 44% of Telecosin's capital is worth at least 12.6 million euros. We consider that any professional financial firm, given the collaboration of the Telecosin management team, could sell an interest of this kind without any difficulty to one of the many venture capital firms interested in this industry or to a foreign company in the industry."

(3) What do readers think of this comparison?

Decision of the Court of Arbitration

"Establishing with any certainty the price of Telecosin at a date already in the past and in an environment in which there have been considerable changes is a difficult and delicate task. It is impossible to arrive at a precise figure; the best to be hoped for is an approximation. Nevertheless, this Court is obliged to make a decision on this point.

"AAA presented a valuation based on what is known as the comparable transactions method. Some securities firms and investment banks used this method for a period of approximately two years (between 1998 and 2000). There was a clear reason for using it: it was impossible to explain the exorbitant prices paid for many new economy firms using the methods in general use up until then. The comparable transactions method never had any theoretical underpinnings. And certainly, after the summer or autumn of 2000 it was totally discredited. This method is therefore not worth considering.

"We are left, therefore, with the discounted cash flow method, which is the most widely accepted method of firm valuation, and the one that the Panel of Arbitrators considers most appropriate in this case.

"The valuator serving as expert witness in this case accepts that cash flow discounting is the most appropriate method. To calculate the value of Telecosin he has selected four cash flow scenarios and has applied to each one a discount rate (Ke) of 9% and a growth rate of cash flows from 2007 of 4%.

"Determining future flows is always a one-time estimate subject to significant variations. For that reason, the most widely accepted view is that it is not sufficient to give just one such estimate of these future flows. Instead, a range of different scenarios must be considered, each with a different cash flow stream depending on different hypotheses regarding the growth of the business and changes in its environment. Each of these scenarios, and thus also each future cash flow stream, is assigned a probability. The value is the weighted average of the whole set of scenarios.

"Consequently, the valuator has re-examined the probabilities of each scenario and has produced the following valuation of Telecosin in million euros:

Scenario	**Value of shares (E)**	**Probability (p)**	**E x p**
Optimistic	5.84	20%	1.17
Average	2.46	40%	0.99
Pessimistic	0.97	25%	0.24
Catastrophic	0	15%	0.00
Final valuation			2.40

"44% of this value equals 1.05 million euros. As the exercise price of the call option agreed by the parties is 0.535 million euros, the difference is the amount due in compensation. Consequently, Mr. Cuadrado must pay to AAA compensation in the amount of 0.515 million euros. Besides the above-mentioned compensation, Mr. Cuadrado must return to AAA the price of the premium paid for the call option in the amount of 18,000 euros.

"With respect to the request for a rescission of the agreement whereby AAA purchased from Mr. Cuadrado 5% of the shares of Telecosin for a price of 36,000 euros,

the Panel of Arbitrators understands that it is right that the agreement be rescinded, but that the rescission is justified not by non-performance on the part of the sellers but by the fact that the purpose of the agreement has been frustrated, a fact attributable not to said sellers but to Mr. Luis Cuadrado. For that reason, the Panel considers it fair and equitable that the agreement be rescinded, whereupon, on the one hand, the shares shall be returned to their original owner and, on the other, the price paid for said shares shall be repaid, plus any legal interest accrued from the date on which the payment was originally made to the date on which the repayment is made effective.

"The costs of these arbitration proceedings is 93,400 euros plus VAT (arbitrators' fees and expenses: 81,000 euros plus VAT; court expenses: 12,300 euros plus VAT). As there is no evidence of reckless or unscrupulous behavior on the part of either party, the costs of this arbitration, consisting of the arbitrators' fees and the court fees, shall be borne by the parties in equal measure."

37.11. Valuation of Internet companies using esoteric multiples

This section summarizes the valuation of Terra's shares performed by a Euroamerican bank in April 2000, when Terra's share price was 73.8 euros. As the valuation given by Table 37.21 is 104 euros per share, the bank advised its customers to buy Terra shares.

Table 37.21. Valuation of Terra performed by a Euroamerican bank on 7 April 2000

	Price per share ($)	Million shares	Capitalization ($ million)	Net debt	EV (enterprise value)
AOL	65.0	2,282	148,315	–1,472	146,843
Yahoo!	158.0	526	83,184	–1,208	81,976
Lycos	61,5	110	6,760	–618	6,142
Excite@Home	30,0	352	10,559	302	10,861
Go Networks	19,0	165	3,133	349	3,482
NBC Interactive	38,5	32	1,223	259	1,482
About.com	65,0	17	1,075	–176	899
The Go2Net	71,4	31	2,182	214	2,396
Ask Jeeves	59,0	35	2,062	–166	1,896
LookSmart	38,0	88	3,340	–97	3,243
Juno	13,8	39	531	–89	442
Infospace	65,5	217	14,186	–89	14,097
GoTo.com	43,0	49	2,107	–104	2,003
Earthink	18,0	138	2,489	–206	2,283
TheGlobe.com	5,0	30	152	–52	100
Sum of the 15 largest information hubs in USA			**281,298**	**–3,153**	**278,145**

No. inhabitants (million)	273
EV per capita (US$)	1,019
GNP per capita in the US (US$)	32,328

	GNP per capita (US$)	GNP per capita vs. USA (%)	Adjusted EV per capita (US$)	Million inhabitants	Terra market share (%)	Value
	[1]	[2]	[3]	[4]	[5]	[6]
Spain	17,207	53%	542	39	30%	6,345
Hispanic America	16,164	50%	509	30	5%	764
Latin America	7,513	23%	237	338	25%	20,008
Average	***9,080***	***28%***	***286***	***407***	***23%***	
Value of Terra ($ million)						**27,117**
Net debt ($ million)						–525
Implicit capitalization ($ million)					27,642	

Million shares: 280	Dollar/euro exchange rate: 0.94875	**Price per share (euros)**	**104**

The valuation is based on the 15 largest Internet companies in USA. The first column gives the price per share, the second column the number of shares outstanding, and the third column the companies' capitalization in million dollars. When the net debt is added to the capitalization, what the bank calls enterprise value (EV) is obtained, that is, the company's value. Thus, the sum of the enterprise values of the 15 largest Internet companies in USA was 278.145 billion dollars. The Euroamerican bank's analyst then divided this quantity by the number of inhabitants in USA, which he estimated to be 273 million, obtaining the EV per capita in USA: 1,019 dollars.

At the bottom of Table 37.21, the analyst divided Terra's market into 3 geographical areas: Spain, Hispanic America (American citizens who are Spanish speakers) and Latin America. Column [1] shows the gross national product per capita in each of the three geographical areas, and column [2] shows the percentage they represent with respect to the gross national product per capita in USA ($32,328). Column [3] is the result obtained by multiplying the EV per capita in USA (1,019 dollars) by the ratio between the gross national product per capita in each of the three geographical areas and the North American gross national product per capita (column [2]). He then multiplied column [3] by the number of inhabitants in each geographical area (column [4]) and by Terra's estimated market share in each of these markets (column [5]), and obtained Terra's value in each of these geographical areas (column [6]). Adding the 3 amounts in column [6], he arrived at the value for Terra: 27.117 billion dollars. After subtracting the net debt from this amount, he obtained Terra's implicit capitalization: 27.642 billion dollars. By dividing this quantity by the number of Terra shares (280 million) and by the euro's exchange rate, the analyst obtained the value of the Terra share: 104 euros per share.

Doesn't this valuation seem surprising to the reader? We can propose another way of getting the figure of 104 dollars per share: The value of the Terra share is twice the age of Manolo Gómez's mother-in-law, who is 52. We chose Manolo because he lives near Terra's corporate headquarters. Of course, this valuation is absurd, but it has the same rigor as that given in Table 37.21. As the saying goes, "the blind man dreamt he saw and he dreamt what he wanted to see" (4).

(4) Other valuations of Internet companies using esoteric multiples may be seen in Fernández (2002), chapter 12.

Figure 37.2. Market price of the shares of Terra

Date	Share price
17/11/99	11.81IPO
17/11/99	37.00
18/11/99	31.45
25/02/00	139.75Max
31/03/00	84.15
28/04/00	68.05
31/05/00	49.00
30/06/00	40.50
29/12/00	11.60
31/12/0	19.20
31/12/0	24.01
31/3/03	4.40

37.12. Cost of capital in emerging countries, illiquidity premium and small caps premium

We present the real cost of the unlevered equity (Ku) in US$ for an edible oil company operating in Ukraine as of March 31, 2001 calculated by three different investment banks. The Ku is calculated in real terms in US$ because the expected FCF were expressed also in real US$. The real Ku provided by the three investment banks was quite different: 15.72%, 12.2% and 10.92%. The impact on the valuation is big and may be seen in the following table:

	2001	2002	2003	2004	2005	2006	2007	2008	Recurring	g
FCF (real US$ million)	7.7	17.7	14.5	–23.3	2.6	27.6	29	32	32	2%

Ku in real US$	15.72%	12.20%	10.92%
Value of unlevered equity (Vu) as of March 31, 2001 (US$ million)	127.9	190.3	226.4

37.12.1. "The Ukrainian country risk premium has been adjusted to neutralize the political risk, which is covered by the insurance policy (5). Usually in the country risk premium, political risk accounts for 50%. The specific risk premium accounts for the fact that the strong competitive advantage will be challenged in the medium term, although this effect cannot be modeled within the cash flow projections."

	Ukraine		Source
US nominal risk-free rate	5.50%		30-year US bonds
US long-term inflation rate	3.00%		World Bank
US real risk-free rate (RF)	2.50%	A	
Country risk premium	13.50%		Bloomberg (Sovereign bonds premium)
Adjusted country risk premium (Crs)	6.75%	B	
Adjusted risk-free rate	9.4%	C = (1 + A)(1 + B)-1	
Unlevered equity beta (ßu)	0.34	D	Bloomberg
US equity market risk premium	5.00%	E	Ibbotson
US small size equity premium	2.60%	F	Ibbotson
Specific premium	2.00%	G	
Unlevered cost of equity	**15.72%**	C + D x E + F + G	

(5) The company had an insurance policy with cover of $50 million.

37.12.2. "The unlevered cost of capital is an estimation of equity investors' return expectations considering the operational risk of the Company only and is calculated as follows:

$$Ku = RF + Crs + ßu \times [(Rm - RF) + Lr]$$

"The real risk-free rate for Ukraine is derived from the U.S. risk-free rate of 4.59% (yield of the 10-year U.S. treasury bond) less a 2.5% inflation correction (source: U.S. Treasury) as business plan figures are expressed in real terms rate (RF = 4.59% – 2.5% = 2.09%). A Ukrainian country risk spread (Crs) of 7.5%, based on the country rating of B– (source: S&P, Fitch IBCA and Thomson), is added. RF + Crs = 9.59%.

"The equity risk premium (Rm – RF) retained corresponds to the European historical risk premium of 5% shown in the Millenium Book (source: ABN Amro and London Business School).

"The liquidity risk premium (Lr) is the additional premium observed for small companies, which are usually considered riskier. We use the average illiquidity discount for small caps from Détroyat Associés from January to March 2001 (3.42%).

"The unlevered beta has been calculated as the average of the following sample:

Diversified Oil Seed Companies	Equity Beta (Bloomberg)	Market cap.	Net debt	Tax rate	Unlevered Beta
Archer Daniels Midland	0,50	7664	3933	35%	0.37
Aarhus Oliefabrik A/S	0,47	920	1461	36%	0.23
Koipe SA	0,25	350	–133	35%	0.33
Average	0,41				0.31

Ku = 4.59% – 2.5% + 7.5% + 0.31 x [5% + 3.42%] = 12.2% in March 2001."

37.12.3. "To calculate the cost of equity in real terms in US$ we have used the following parameters prevalent in the markets at the time of the valuation (March 2001):

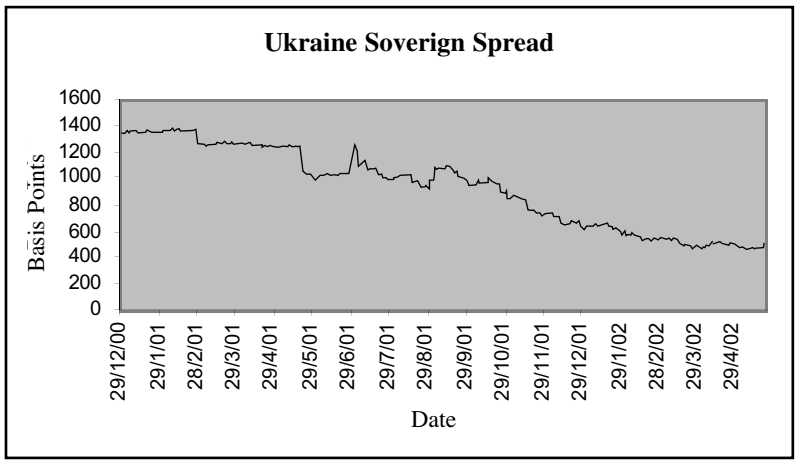
A. U.S. Risk-Free Rate: 5.5% (30-year U.S. government bonds)
B. Expected U.S. Inflation Rate: 3.0% (IMF forecast)
C. Country risk premium: 6.5% (see below)
D. U.S. Equity premium: 4.0% (market average)
E. Beta for operations (unlevered): 0.48 (average of the betas from a sample of individual firms)

"As a measure of the systematic risk of the operations (unlevered beta) we have used the estimated average of the unlevered beta for firms operating in the food-processing industries. This beta is calculated as the average of the unlevered beta from a sample of individual firms computed from a five-year sample using monthly returns. This is an appropriate measure of systematic risk given that investors in Ukraineoil have access to world equity markets. The estimated unlevered beta is 0.48.

"Calculation of the Risk Premium for Ukraine:

We have the following quantitative information for the calculation of the risk premium in the Ukraine on March 2001:

Spread on EBRD loan	5.0%
Spread on Ukraine Sovereign Bonds	13.5%
"Fitted" Spread on Ukraine Sovereign Bonds	7.5%



"These three indicators suggest that the market spread on Ukraine sovereign bonds in March 2001 was also unusually high and that a more stable risk premium should be calculated from the spread on the EBRD loan and the fitted spread. We will also use the fitted spread on Ukraine sovereign bonds in March 2001, i.e. 7.5%, as the measure of Ukraine's country risk premium (again note that this is a conservative estimate since by June 2002 it had already dropped to 4.5%).

"Cost of Equity in real terms in US.$ = A – B+ C + E x D = 5.5% – 3% + 6.5% – 0.48 x 4% = 10.92%"

37.12.4. Differences among the three unlevered cost of equity calculations

Table 37.22 contains the different parameters used by the three valuators. The final calculation of Ku is done with the formulas used in the first valuation. Note that if the Ku calculation were performed with the formulae of the first valuation, the values for the second and third valuations would have been 14.72% and 11.08%, instead of 12.2% and 10.92%.

Table 37.22. Unlevered cost of equity if calculated according to the procedure of 37.12.1

line		37.12.1	37.12.2	37.12.3	
1	US nominal risk-free rate	5.50%	4.59%	5.50%	
2	US long-term inflation rate	3.00%	2.50%	3.00%	
3	US real risk-free rate (RF)	2.50%	2.09%	2.50%	A
4	Country risk premium	13.50%	7.50%	7.50%	
5	Adjustment factor	0.5	1.0	0.867	
6	Adjusted country risk premium (Crs)	6.75%	7.50%	6.50%	B
7	Adjusted risk-free rate	9.42%	9.75%	9.16%	C = (1+A)(1+B) – 1
8	Unlevered equity beta (ßu)	0.34	0.31	0.48	D
9	US equity market risk premium	5.00%	5.00%	4.00%	E
10	Small size equity premium	2.60%	3.42%	0.00%	F
11	Specific premium	2.00%	0.00%	0.00%	G
12	Unlevered cost of equity (Ku)	15.72%	14.72%	11.08%	C+ DxE+F+G

The main differences among the three calculations of Ku are:

1. Line 1. The nominal risk-free rate. The first and third valuation use the yield on 30-year US Gov. Bonds, while the second valuation uses the yield on the 10-year US Gov. Bonds.
2. Line 2. US long-term inflation rate. The first and third valuation use 3% as expected inflation, while the second valuation uses 2.5%.
3. Line 4. Country risk premium. The first valuation uses 13.5%, the second and the third 7.5%.
4. Line 5. Adjustment factor. The first and third valuations adjust the country risk premium due to the insurance policy. The second valuation does not adjust.
5. Line 7. The first valuation uses formula (37.12.1), while the second and third use formula (37.12.2).
   Adjusted risk-free rate = (1 + US real risk-free rate) (1 + Adjusted country risk premium) –1 (37.12.1)
   Adjusted risk-free rate = US real risk-free rate + Adjusted country risk premium (37.12.1)
6. Line 8. Unlevered equity beta (ßu). Each of the three valuations uses a different one.
7. Line 9. US equity market risk premium. The first and the second use 5%, the second 4%.
8. Line 10. Small size equity premium. The first and second valuations consider a small size premium, while the third does not. An additional difference between the first valuator and the second is the way they add the small size equity premium: the first adds it, while the second multiplies the small size equity premium by the beta.
9. Line 11. Specific premium. The first valuator considers a specific premium; the second and the third do not.

37.12.5. Our judgment of the three calculations

First of all, let's look at the manifest errors.

1. *Specific premium*. The first valuator uses a specific risk premium of 2%, arguing that "the strong competitive advantage will be challenged in the medium term, although this effect cannot be modeled within the cash flow projections". Obviously this is wrong. If "the strong competitive advantage will be challenged in the medium term", it should be reflected in lower projections of volumes and margins. But it has nothing to do with the riskiness of the cash flows of 2002.

2. *Small size equity premium*. The second valuator introduces what he calls "The liquidity risk premium (Lr)", but defines it as a small size equity premium ("is the additional premium observed for small companies, which are usually considered riskier"). He considers the average illiquidity discount for small caps from Détroyat Associés from January to March 2001 (3.42%). In the current case such a risk does not exist since there is a "willing buyer and a willing seller" and, according to the shareholders agreement, "the Fair Market Value of the Shares corresponds to 49% of the Fair Market Value of the Company." Even if a size/liquidity premium was appropriate, the 3.42% used by the second valuator is inappropriate for the following reasons:

   1. The size premium is highly unstable, varies over time and is not always present (6). Therefore, the size premium to use for valuation should be a long-run premium, not a short-run premium. They use a 3-month premium, which is clearly inappropriate.

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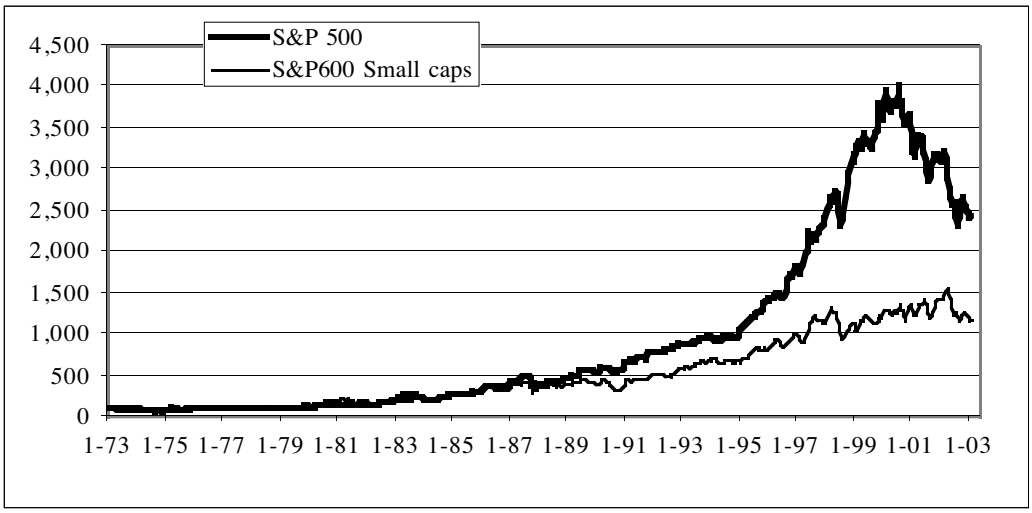
(6) Knetz and Ready (1997) show that the often mentioned size discount in U.S. stock markets disappears if 16 out of 396 months for the 1963-1990 period are deleted.

2. The company is not a small firm in the context of the Ukraine economy, so the size premium for that market should not apply.

3. The size premium reported in the literature is much smaller than 3.42% or even positive. For instance, for the French market (the one used) the size premium between 1986 and 1998 was estimated to be on average 0.44%, with a maximum during this period of 1.64% (7). Figure 37.3 shows the evolution of the S&P 500 (large caps) and of the S&P 600 (small caps) (8) in the period 1973-2003. It is clear that the return of the small caps index (S&P 600) was smaller than the return of the large caps index. If the return differential (2.28% annual) was a good approximation for the small size premium, then the small size premium should be negative (–2.28%).

Figure 37.3. Evolution of the S&P 500 (large caps) and of the S&P 600 (small caps) in the period 1973-2003



Also, Wang (2000) reports that "previous studies find that small stocks have higher average returns than large stocks, and the difference between the returns cannot be accounted for by the systematic risk, beta. In my analysis of Compustat and CRSP data from 1976 to 1995, and simulation experiments based on the data, I find the size effect can be largely explained by data truncation that is caused by survival. I conclude that the size effect is largely a spurious statistical inference resulting from survival bias, not an asset pricing anomaly."

3. Illiquidity premium. Damodaran (2001, page 245) notices that "the estimation of illiquidity discounts seems arbitrary, with discounts of 25% to 30% being most commonly used in practice." A liquidity premium is defined as "a decrease in the Fair Market Value

(7) J. Hamon and B. Jacquillat (1999), "Is there Value-added information in Liquidity and Risk Premiums?" *European Financial Management*.

(8) The S&P Small Cap 600 was launched in October, 1994. It provides a representative sample of the small-cap population, with an emphasis on institutional investability. It includes a selection of stocks across a variety of economic sectors and industry groups. The Small Cap 600 does not include IPOs, which are sometimes hot, sometimes not and often illiquid. It also does not include REITs, which are generally viewed as real estate investments. The Small Cap 600 is gaining wide acceptance as the preferred benchmark for both active and passive management due to its low turnover and greater liquidity. Approximately $8 billion is indexed to the S&P SmallCap 600.

of the Asset due to the fact that the seller cannot find a buyer willing to pay that Fair Market Value" (9). In the current case such a risk does not exist since there is a "willing buyer and a willing seller" and according to the shareholders agreement "the Fair Market Value of the Shares corresponds to 49% of the Fair Market Value of the Company".

4. Market Risk Premium. The second valuator uses a risk premium of 5% based on the "average European historical risk premium". The source of the data used by the second valuator clearly states that this historical number is an upward bias and should not be used as a predictor of a future risk premium. The authors of the work cited by the second valuator conclude in their analysis that "a set of forward-looking, geometric mean risk-premia for the United States, United Kingdom and for the world all falling within the range of around 2.5 and 4 percent, and a corresponding set of arithmetic mean risk premia falling in a range of around 3.5 to 5.25 percent" (10). Therefore, the number used by the second valuator is clearly too large and a number of 4 percent is a more realistic conservative estimate.

5. Country Risk Premium. The appropriate country risk premium should be a measure of the risk premium required by investors participating in equity markets in Ukraine.

   For the calculation of this country risk premium in emerging markets one possibility is to look at the differential between the long-term sovereign bonds of the emerging market denominated in dollars and the U.S. government bonds of the same maturity. This is a broad measure of the default risk involved in the sovereign debt of that country relative to what is perceived to be the risk-free rate (i.e. the U.S. government bond).

   Despite the widespread use of this measure of country risk premium, it is a very rough approximation, highly criticized in the literature, and a measure that, if taken at face value, might lead to very erroneous conclusions. Therefore, its use should be thoroughly reasoned. The main reasons why this measure can be a bad estimate of market risk premium for corporate valuation are:

   1. *Government Default*: It is a measure of the probability of default on government securities and not on corporate securities. This measure may not be appropriate for the valuation of corporate operations in countries that, when they defaulted in government securities, this default did not imply the default of corporate and private debt in the country. This was the case in Russia in 1998. In fact, recent examples of sovereign defaults, such as the Russian example, has led the leading rating agencies to abandon their long-run policy that sovereign debt ratings were a ceiling for the ratings of corporates from those countries (see Moody's, 2001). These rating agencies currently explicitly acknowledge the possibility that corporate ratings could be higher than their corresponding sovereign ratings in situations in which the sovereign rating is under stress.

   2. *Preferred Creditor*: Sovereign country risk, computed as the spread on government securities, is not appropriate for private corporations that are capable of accessing world debt markets on much better terms than their respective sovereign governments (see Standard & Poors (2001) and Durbin and Ng (1999)).

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(9) Pennam (2001) argues: "The risk of having to trade at a price that is different from intrinsic value because of a scarcity of traders is called liquidity risk" (p. 706).

(10) Dimoson, E., P. March and M. Staunton (2002) "Global Evidence on the Equity Risk Premium", *Journal of Applied Corporate Finance*, September.

3. *Market Liquidity*: The corporate bond market is a far deeper market, in terms of the number of participants, than the country bond market, and thus less volatile on a period-by-period basis (see Damodaran, 2000). This lack of liquidity in the sovereign market results in periods in which corporate bonds offer significantly lower yields than sovereign bonds (Kaminsky and Schmukler (2001)).

4. *Diversification*: Some authors even argue that to the extent that country risk is diversifiable in world markets, there should be no country risk at all.

All of these arguments are relevant for the valuation of the Ukrainian company on March 2001. More specifically:

1. *Government Default*: Ukraine had experienced defaults in its government securities just prior to March 2001. However, those defaults did not imply the default of corporate obligations from Ukrainian corporations. As mentioned above, exactly this experience has led the leading rating agencies to revise their rating policies to explicitly allow for situations in which corporate investments have lower risk than their sovereign counterparts. Therefore, the risk premium that should apply to the Ukrainian company should reflect this fact.

2. *Preferred Creditor*: The company has access to international debt markets at a much better rate than the number suggested by the sovereign spreads. The company had arranged a line of credit from the European Bank for Reconstruction and Development (EBRD) and was paying, in March 2001, a rate of LIBOR + 5%. This loan suggests a default risk premium on the order of 5%.

3. *Market Liquidity*: Ukraine had recently defaulted in the sovereign bonds. This situation had drastically decreased the liquidity of its sovereign debt instruments. In March 2001, both Ukraine and Russia had just rescheduled their debt obligations and started to renew their payments to debtors. Despite these improvements in their situation, the sovereign spreads in March 2001 were unreasonably high for the corresponding country ratings of Russia and Ukraine by Moody's and Standard & Poor's. It is a historical pattern that a stable long-run relationship exists between country ratings by Moody's and Standard & Poor's and the size of the sovereign spread. The "fitted" spread from this stable relationship is commonly used as the appropriate measure of country risk, since it is less subject to specific short-run situations of the country and more reflective of the long-run perspective. For instance, this is the measure that BNP Paribas uses for computing country risk in emerging markets (see Bancel and Perrotin). Given the rating of Ukraine in March 2001 (S&P initial coverage rating of B- in Dec. 2001, Moody's had a Caa1 rating), the spread according to this long-run relationship should have been of 7.5% and 5.5%. This effect has since been confirmed by the fact that the ratings of both of these countries have consistently improved. The current rating for the Ukraine from Moody's is B1. This improvement has been confirmed, with spreads for Ukrainian sovereign debt consistently dropping over the last year to a value, in June 2002, of 5.22%.

4. *Diversification*: The business of the company is the marketing and distribution in the CIS of all of its products. This is a region with a large potential for economic development. The company could potentially diversify its activities into other countries in the region if the market situation were to worsen. The company also has an insurance policy for its operations in Ukraine that partially covers the risk associated with operations in that country.

5. *Insurance policy*. Ukraineoil holds an insurance policy that covers a substantial part of the political risk involved in its Ukraine operations. This policy reduces the risk of operating in the country and should be reflected in the country risk premium. The policy provides an insured value of $50 million. There is no direct way of measuring the impact of this policy on the risk premium. It is difficult to determine the proportion of the risk premium that reflects political risk and the percentage of the total value of the asset that the insured value of $50 million represents. To be conservative, we have assumed that the policy does not decrease the country risk premium. This is clearly a very conservative position.

How to calculate the cost of equity is far from clear. There is no consensus in the finance literature. Lessard (1996) proposes to multiply the industry beta (with respect to the world market) by the country beta. Godfrey and Espinosa (1996) add the spread between the yield of an emerging market government bond denominated in dollars and the yield of a comparable US bond, to the risk-free rate (see that it is equivalent to use the yield of an emerging market government bond denominated in dollars as the risk-free rate). In addition, the beta they use is 60% of the ratio between the volatility of the company and the volatility of the world market. Estrada (2000) proposes using a beta equal to the ratio of the downside volatility of the company and the downside volatility of the world market. The definition of downside volatility (σd) is:

$\sigma d = ((1/T) \sum \text{Min}[0, (R_{it} - B)]^2)^{1/2}$
R_{it} is the return of company i in period t, and B is the desired benchmark.

Estrada (2000) also proposes the downside beta (dß) as another variation. Damodaran (2001, page 68) proposes calculating the country risk premium by multiplying the spread between the yield of an emerging market government bond denominated in dollars and the yield of a comparable US bond (Crs) by "an additional equity risk premium by measuring how much more volatile is the Ukrainian equity market than its bond market." The country risk premium for Ukraine, according to Damodaran, should be calculated as follows: Crs x ($\sigma_{\text{EQUITY UKRAINE}} / \sigma_{\text{GOV. BONDS UKRAINE}}$).

We already have seven formulae to calculate the required return to unlevered equity of Ukrainoil in real terms:

[1] 37.12.1: $Ku = [(1+R_F)(1+ Crs) - 1] + ßu \times RP_{USA} + Lr + Sp$
[2] 37.12.2: $Ku = R_F + Crs + ßu \times (RP_{USA} + Lr]$
[3] 37.12.3: $Ku = R_F + Crs + ßu \times RP_{USA}$
[4] Lessard (1996): $Ku = R_F + (ßu \times ß_{UKRAINE}) \times RP_{WORLD}$
[5] Godfrey and Espinosa (1996): $Ku = R_F + Crs + [0.6 \times (\sigma_{UKRAINEOIL}/\sigma_{WORLD})] \times RP_{WORLD}$
[6] Estrada (2000): $Ku = R_F + (\sigma d_{UKRAINEOIL} / \sigma d_{WORLD}) \times RP_{WORLD}$
[7] Estrada (2000): $Ku = R_F + d ß_{UKRAINEOIL} \times RP_{WORLD}$
[8] Damodaran (2001): $Ku = R_F + Crs \times (\sigma_{\text{EQUITY UKRAINE}} / \sigma_{\text{GOV. BONDS UKRAINE}}) + ßu \times RP_{USA}$

R_F = US real risk-free rate
Crs = spread between the yield of a Ukrainian government bond denominated in dollars and the yield of a comparable US bond
ßu = unlevered industry beta
RP = expected market risk premium
Lr = liquidity risk
Sp = Specific premium

σd = downside volatility
dß = downside beta
Only [1] considers specific premium. Only [1] and [2] consider liquidity risk

37.14. A classification of the errors

In this section, we provide a classification of 78 errors, grouped under the following six headings:

- Errors in the discount rate calculation and about the riskiness of the company
- Errors when calculating or forecasting the expected cash flows
- Errors in the calculation of the residual value
- Inconsistencies and conceptual errors
- Errors when interpreting the valuation
- Organizational errors

We provide an example of each error.

1. Errors in the discount rate calculation and about the riskiness of the company

1.A. Wrong risk-free rate used for the valuation

1.A.1. Using the historical average of the risk-free rate as the actual risk-free rate. Taken from a financial consultant: "The best estimate of the risk-free rate to use in the CAPM is the historical average of the US risk-free rate from 1928 until today".

This is patently absurd. Any student who used an average historical rate from 1928 to 2001 in a university examination (not to mention in an MBA) would be failed on the spot. The risk-free rate is by definition the rate that can be obtained now (at the time when Ke is calculated) by buying (risk-free) government bonds now. It is obvious that expectations and forecasts have little to do with the past, or with an average historical rate.

1.A.2. Using the short-term government bond rate as the meaningful risk-free rate in a valuation. Taken from a financial consultant: "The best estimate of the risk-free rate to use in the CAPM is the return of 90-day US Treasury Bills".

The correct way to calculate a company's cost of capital is to use the rate (Yield or IRR) of long-term government bonds (using bonds of a duration similar to that of the expected cash flows) at the time of calculating Ke.

1.B. Wrong beta used for the valuation

1.B.1. Using the historical industry beta, or the average of the betas of similar companies, when the result goes against common sense. An example is the error in section 37.6.

1.B.2. Using the historical beta of the company when the result goes against common sense. Historical betas change dramatically, as shown in Campa and Fernández (2003). They

calculate betas of 3,813 companies each day of December 2001 and January 2002, using 60 monthly returns, and report that a company's maximum beta was, on average, 15.7 times its minimum beta. The median of the maximum beta divided by the minimum beta was 3.07. The median of the percentage daily change (in absolute value) of the betas was 20%, and the median of the percentage (in absolute value) of the betas was 43%. Table 37.16 of this paper and Damodaran (2001, page 72) also show that the calculated betas change dramatically and that they depend very much on the period used to estimate the beta.

1.B.3. Assuming that the beta calculated from historical data captures the country risk. Interpretation of the beta of a foreign company listed on the stock market in the USA. Taken from an investment bank: "The question is: Does the beta calculated on the basis of the company's share price in New York capture the different premiums for each risk? Our answer is yes, because just as the beta captures changes in the economy and the effect of leverage, it must necessarily absorb the country risk."

There are various ways of including a company's country risk component in the CAPM formula. The most common is to use the spread between the long-term dollar treasury bonds of the country in which the firm operates and long-term U.S. Treasury bonds.

1.B.4. Using wrong formulae to lever and unlever the beta. Fernández (2002, page 506) shows six different formulae for levering and unlevering the beta. Only one of them is correct, as shown in Fernández (2003a): the correct relationship between the levered beta (ßL) and the unlevered beta (ßu) is: ßL = ßu + (ßu – ßd) D (1 – T) / E.

The other wrong relationships are:

Damodaran (1994): $ß_L$ = ßu + ßu D (1 – T) / E
Practitioners: $ß_L$ = ßu + ßu D / E
Harris-Pringle (1985), Ruback (1995 and 2002): $ß_L$ = ßu + (ßu – ßd) D / E.
Myers (1974): $ß_L$ = ßu + (ßu – ßd) (D – VTS) / E.
Miles-Ezzell (1980): $ß_L$ = ßu + (ßu – ßd) (D / E) [1 – T Kd / (1+Kd)]

1.B.5. Arguing that the best estimation of the beta of an emerging market company is the company's beta with respect to the S&P 500. "The best way to estimate the beta of an emerging economy company with a U.S. stock market listing is to regress the return of the share on the return of a U.S. stock market index."

No, because it is well known (we have plenty of data to confirm this) that companies that are rarely traded have absurdly low calculated betas. Scholes and Williams (1977), for example, warned of this problem and suggested a method for partly getting over it.

There is also the problem of the instability of betas that have been estimated by regression: they are very unstable and depend very much on the data used to calculate them.

Simply using a share's historical beta without analyzing the share and the company's future prospects is very risky, as historical betas are unstable and depend, in almost all companies, on what data we use (daily, weekly, monthly...).

1.B.6. When valuing an acquisition, using the beta of the acquiring company. From an analyst's report: "As the Target Company is much smaller than the bidder, the Target Company will have almost no influence on the resulting capital structure and the riskiness of the resulting company. Therefore, the relevant beta and the relevant capital structure for the valuation of the Target Company are those of the acquiring company." Wrong, the relevant risk is the risk of the acquired assets. If this was not the case, a Government bond should have different value for every company.

1.C. Wrong market risk premium used for the valuation

1.C.1. The required market risk premium is equal to the historical equity risk premium. Table 37.1.1 shows that the US historical equity risk premium changes considerably depending on the time period used for calculating it. Figures 37.1.1 and 37.1.2 also prove that. The required market risk premium (the one used in valuation to determine the required return to equity) is an expectation and has little to do with history.

Table 37.1.1. Historical equity risk premium in the US

	Average Annual Returns of			Equity Risk Premium	
Arithmetic Average	*Stocks*	*T.Bills*	*T.Bonds*	*Stocks - T.Bills*	*Stocks - T.Bonds*
1928-1953	9.46%	1.03%	2.96%	8.44%	6.51%
1928-1999	12.68%	3.92%	5.05%	8.76%	7.63%
1928-2002	11.60%	3.93%	5.35%	7.67%	6.25%
1962-2002	11.19%	6.03%	7.53%	5.17%	3.66%
1992-2002	10.73%	4.40%	8.58%	6.32%	2.15%

	Average Annual Returns of			Risk Premium	
Geometric Average	*Stocks*	*T.Bills*	*T.Bonds*	*Stocks - T.Bills*	*Stocks - T.Bonds*
1928-1953	6.49%	1.02%	2.92%	5.47%	3.57%
1928-1999	10.76%	3.87%	4.79%	6.89%	5.96%
1928-2002	9.62%	3.89%	5.09%	5.73%	4.53%
1962-2002	9.90%	5.99%	7.14%	3.90%	2.76%
1992-2002	9.09%	4.40%	8.14%	4.69%	0.95%

Figure 37.1.1. Historical equity premium in the US from 1928 until the indicated year

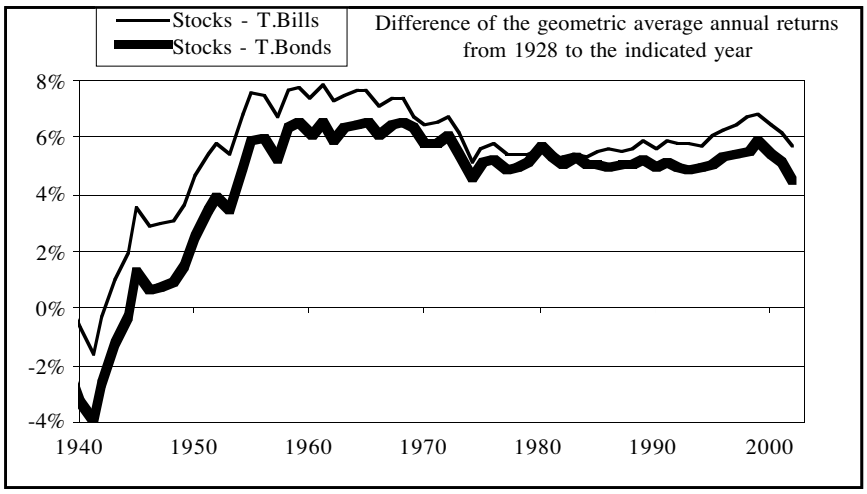
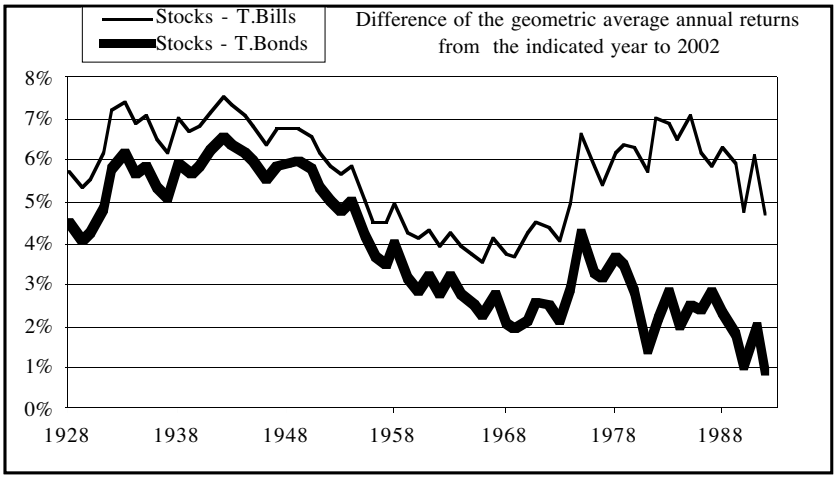


Table 37.1.2. Historical equity premium in the US from the indicated year until December 2002



1.C.2. The required market risk premium is equal to zero. This argument typically follows the arguments of Mehra and Prescott (1985) and Mehra (2003), who say that "stocks and bonds pay off in approximately the same states of nature or economic scenarios, and hence, they should command approximately the same rate of return." Siegel (1998 and 1999) interprets Table 37.1.1. by saying: "although it may seem that stocks have more risk than long-term Treasury bonds, this is not true. The safest long-term investment (from the viewpoint of preserving the investor's purchasing power) has been stocks, not Treasury bonds."

1.D. Wrong calculation of WACC

1.D.1. Wrong definition of WACC. An example is error 1 in section 37.4.

1.D.2. The Debt to equity ratio used to calculate the WACC is different from the Debt to equity ratio resulting from the valuation. An example is error 1 in section 37.2. (Use of book values, do not iterate…)

1.D.3. Using discount rates lower than the risk-free rate. An example is error 3 in section 37.3. Ke and Ku are always higher than the risk-free rate. WACC may be lower than the risk-free rate only for investments with extremely low risk. An example of that may be found in Ruback (1986) (11).

1.D.4. Using the statutory tax rate instead of the effective tax rate of the levered company. There are many valuations in which the tax rate used to calculate the WACC is the statutory tax rate (normally arguing that the correct tax rate is the marginal tax rate). However, this is wrong. The correct tax rate to use for calculating the WACC for valuing a company is the effective tax rate of the levered company in every year.

(11) Ruback, Richard S. (1986), "Calculating the Market Value of Risk-Free Cash Flows", *Journal of Financial Economics* (March), pp. 323-339.

1.D.5. Valuing all the different businesses of a diversified company using the same WACC (same leverage and same Ke).

1.D.6. Considering that WACC / (1 – T) is a reasonable return for the stakeholders of the company. Some countries assume that a reasonable return for the assets of a telephone company is WACC/(1 – T). Obviously this is not correct. It could be valid only for non-growing perpetuities and if the return on assets was calculated before taxes.

1.D.7. Using a wrong formula for the WACC when the value of debt (D) is not equal to its book value (N). Fernández (2002, page 416) shows that the expression for the WACC when the value of debt (D) is not equal to its book value (N) is WACC = (E Ke + D Kd – N r T) / (E + D). Kd is the required return to debt and r is the cost of debt.

1.E. Wrong calculation of the value of tax shields

1.E.1. Discounting the tax shield using the cost of debt or the required return to unlevered equity. Many valuators assume, following Ruback (1995 and 2002), that the Value of tax shields (VTS) is the present value of tax shields (D Kd T) discounted at the required return to unlevered equity (Ku). There are also many valuators that assume, following Damodaran (1994), that the Value of tax shields (VTS) is the present value of tax shields discounted at the cost of debt (Kd). Fernández (2003a) proves that both expressions are incorrect and that the value of tax shields is the present value of D Ku T discounted at the required return to unlevered equity (Ku): VTS = PV[D Ku T; Ku]

1.E.2. Odd or ad-hoc formulae. Fernández (2002, page 506) shows different expressions for calculating the value of tax shields that are frequently used and that are supported by some papers in the financial literature. But Fernández (2003a) proves that the value of tax shields is the present value of D Ku T discounted at the required return to unlevered equity (Ku): VTS = PV[D Ku T; Ku].

Some wrong formulae to calculate the value of tax shields are:

Harris-Pringle (1985) and Ruback (1995 and 2002): PV[Ku; D T Kd]
Myers (1974): PV[Kd; D T Kd]
Damodaran (1994): PV[Ku; DTKu - D (Kd – R_F) (1 – T)]
Practitioners: PV[Ku; DTKd – D(Kd- RF)]
Miles-Ezzell (1980): PV[Ku; D T Kd] (1 + Ku)/ (1 + Kd)

1.F. Wrong treatment of country risk

1.F.1. Not taking Country Risk into account, arguing that it is diversifiable. Taken from a regulator: “It is not correct to include the country risk of an emerging country because from the perspective of global investors only systematic risk matters, and country specific events will be uncorrelated with global market movements. Therefore, country specific events will be unsystematic risk, totally uncorrelated with global market movements.” According to this, the required return to equity will be equal for a US diversified portfolio and for a Bolivian diversified portfolio.

1.F.2. Assuming that a disaster in an emerging market will increase the calculated beta, in relation to the S&P 500, of the country’s companies. Taken from a financial

consulting firm: "The occurrence of any dramatic systemic event (devaluation, end of convertibility, capital transfer controls, threats to democratic stability) that significantly raises the country risk will lead automatically to a substantial increase in the estimated beta, in relation to the S&P500, of the companies that operate in that country."

No. That is why, when valuing companies in emerging countries, we use the country risk, because the beta no longer captures all of the above-mentioned risks: devaluation, end of convertibility, capital transfer controls, threats to democratic stability...

Also, if ADRs have low liquidity (if they are traded only a few times each day and are unlikely to be traded exactly at the close of each session, which is when analysts usually take prices for calculating betas), then the calculated beta will tend towards zero, owing to the non-synchronous trading effect, which is perfectly described by Scholes and Williams (1977).

1.F.3. Assuming that an agreement with a government agency eliminates country risk. Taken from an investment bank: "If a government grants a company a monopoly of a particular market, with agreements that guarantee legal and tax stability and economic equilibrium, then there is no country risk (such as devaluation, end of convertibility, capital transfer controls, threats to democratic stability)."

No. The risks of devaluation, end of convertibility, capital transfer controls, threats to democratic stability, etc. remain. No government can eliminate its own risk. That is to say, the shares of a company that operates in a country cannot have less risk than the government bonds of that country. A Company's shares would have exactly the same risk as the country's government bonds only if the government were to guarantee and fix future dividends for shareholders. However, that does not usually happen.

1.F.4. Assuming that the beta provided by Market Guide with the Bloomberg adjustment incorporates the illiquidity risk and the small cap premium. Taken from an investment bank: "The Market Guide beta captures the distorting effects of the share's low liquidity and the small size of the firm through the so-called Bloomberg adjustment formula."

No. The so-called "Bloomberg adjustment formula" is simply an arbitrary adjustment to make the calculated betas converge towards 1. The arbitrary adjustment consists of multiplying the calculated beta by 0.67 and adding 0.33. Adj. Beta = 0.67 * raw beta + 0.33. It must be stressed that this adjustment is completely arbitrary.

1.G. Including an illiquidity, small-cap, or specific premium when it is not appropriate.

Examples are errors 1 and 2 in section 37.12.

2. Errors when calculating or forecasting the expected cash flows

2.A. Wrong definition of the cash flows

2.A.1. Forgetting the increase in Working Capital requirements when calculating Cash Flows. An example is error 1 in section 37.3.

2.A.2. Considering an increase in the company's cash position or financial investments as an equity cash flow. An example is error 2 in section 37.1; and another is in Damodaran (2001, page 211), where the author argues that "when valuing a firm, you should add the value of cash balances and near-cash investments to the value of operating assets". In several Internet company valuations, analysts calculate the present values of expected cash flows and add the cash of the company, even when it is well known that the company will not distribute it in the foreseeable future.

2.A.3. Errors in the calculation of the taxes that affect the FCF. Using the taxes paid (in $ amount) by the levered company. Some valuators use the statutory tax rate or a tax rate different to the tax rate of the levered company for calculating the FCF. Fernández (2002, page 501) claims that the correct tax rate that should be used to calculate the FCF is the tax rate of the levered company.

2.A.4. Expected Equity Cash flows are not equal to expected dividends plus other payments to shareholders (share repurchases…). There are several valuation reports in which the valuator computes the present value of positive Equity Cash Flows in years when the company will not distribute anything to shareholders. Also, Stowe, Robinson, Pinto, and McLeavey (2002) say that "Generally, Equity Cash Flow and dividends will differ. Equity Cash Flow recognizes value as the cash flow available to stockholders even if it is not paid out." Obviously this is not correct, unless we assume that the amounts not paid out are reinvested and get a return equal to Ke (the required return to equity).

2.A.5. Considering net income as a cash flow. Fernández (2002, page 178) points out that net income is equal to the equity cash flow only in a no-growth perpetuity (constant P&L and constant Balance sheet company).

2.A.6. Considering net income plus depreciation as a cash flow. Taken from a valuation performed by an institution: "The sum of the net income plus depreciation is the rent (cash flow) generated by the company." Then, the valuator concluded that the equity value was the net present value of this "rent".

2.B. Errors when valuing seasonal companies

2.B.1. Wrong treatment of seasonal working capital requirements. Fernández (2003b) shows that the equity value calculated using annual data without making the adjustments understates the true value by 45% if the valuation is done at the end of December, and overstates the true value by 38% if the valuation is done at the end of November. The error of adjusting only by using average debt and average working capital requirements ranges from –17.9% to 8.5%.

2.B.2. Wrong treatment of inventories that are cash equivalent. Fernández (2003b) shows that when the inventories are a liquid commodity such as grain or seeds, it is not correct to consider all of them as working capital requirements. The excess inventories financed with debt are equivalent to a set of futures contracts: not taking this into account undervalues the company.

2.B.3. Wrong treatment of seasonal debt. Fernández (2003b) shows that the equity value calculated using annual data without making the adjustments understates the true value by 45% if the valuation is done at the end of December, and overstates the true value by 38% if the valuation is done at the end of November. The error of

adjusting only by using average debt and average working capital requirements ranges from –17.9% to 8.5%.

2.C. Errors due to not projecting the balance sheets

2.C.1. Forgetting balance sheet accounts that affect the cash flows. In a balance sheet,

$WCR + NFA = D + Ebv.$
It also holds that
$\Delta WCR + \Delta NFA = \Delta D + \Delta Ebv.$

There are many valuations that are wrong because the valuator did not project the balance sheets and the increase of assets ($\Delta WCR + \Delta NFA$, which appear in the cash flow calculation) does not match the assumed increase of debt plus the assumed increase of the book value of equity.

2.C.2. Considering an asset revaluation as a cash flow. In countries with high inflation, companies are permitted to revaluate their fixed assets (and their net worth). But this is only an accounting appreciation and not a cash outflow (although the fixed assets increase) nor a cash inflow (although the net worth increases).

2.C.3. Interest payments are not equal to debt times cost of debt. In several valuations, this simple relationship did not hold.

2.D. Exaggerated optimism when forecasting the cash flows

Two examples are error 5 in section 37.3 and the Enron valuation in section 37.9.

3. Errors in the calculation of the residual value

3.A. Inconsistent Cash flow used to calculate the value of a perpetuity. An example is error 1 in section 37.1.

3.B. Debt to equity ratio used to calculate the WACC to discount the perpetuity is different to the Debt to equity ratio resulting from the valuation. An example is error 2 in section 37.2.

3.C. Using ad hoc formulas without any economic meaning. An example is error 4 in section 37.2.

3.D. Using arithmetic averages instead of geometric averages to assess the growth. An example is the error in section 37.8.

3.E. Calculating the residual value using a wrong formula. When the residual value is calculated as a growing perpetuity, the correct formula is $RV_t = CF_{t+1} / (K - g)$. RV_t is the residual value in year t. CF_{t+1} is the cash flow of the following year. K is the appropriate discount rate and g is the expected growth of the cash flows. But many valuations use the following wrong formulae:

$$RV_t = CF_t / (K - g)$$
$$RV_t = CF_{t+1} (1+g) / (K - g)$$

4. Inconsistencies and conceptual errors

4.A. Conceptual errors about the free cash flow and about the equity cash flow

4.A.1. Considering the cash in the company as an equity cash flow when the company will not distribute it. An example of this is error 2 in section 37.1.

4.A.2. Using real cash flows and nominal discount rates or viceversa. An example is error 2 in section 37.4.

4.A.3. The free cash flow and the equity cash flow do not accomplish ECF = FCF + ΔD – Int (1-T). This equation represents the relationship between the equity cash flow and the free cash flow. It may be found in Fernández (2002, pages 42 and 401). There are many valuation reports in which, given the FCF, the debt increase (ΔD), the interest payments (Int), and the effective tax rate (T), the calculated ECF bears no relation at all to the expected equity cash flows of the company (dividends plus share repurchases).

4.B. Errors when using multiples

4.B.1. Using the average of multiples extracted from transactions executed over a very long period of time. An example is error 1 in section 37.5.

4.B.2. Using the average of transactions multiples that have a wide dispersion. An example is error 2 in section 37.5.

4.B.3. Using multiples in a way that is different from their definition. An example is the error in section 37.7.

4.B.4. Using a multiple from an extraordinary transaction. An example is the valuation in section 37.10.1.

4.B.5. Using ad hoc valuation multiples that go against common sense. An example is the valuation of Terra in section 37.11.

4.C. Time inconsistencies

4.C.1. Assuming that the equity value will be constant in the future. Taken from an analyst valuation report: "as we do not know the evolution of the equity value of the company, a good approximation is to assume that the equity value will remain constant in the following five years." This is not correct. Fernández (2002, pages 401 and 497) shows that the relationship between the equity value of different years is: $E_t = E_{t-1} (1+Ke_t) – ECF_t$. Note that the equity value is constant ($E_t = E_{t-1}$) only if $ECF_t = E_{t-1} Ke_t$. It only happens in no-growth perpetuities.

4.C.2. The Equity value or the Enterprise Value do not accomplish the time consistency formulae. Fernández (2002, pages 401) shows that the relationship between the enterprise value of different years is: $E_t + D_t = (Et\text{-}1+D_t–1) (1+WACCt) – FCF_t$.

4.D. Other conceptual errors

4.D.1. Not considering cash flows resulting from future investments. An example is the valuation of Oleina Holding, an edible oil company that was market leader in Ukraine, with strong volume and brand recognition also in Russia. The company was almost at full capacity and had plans to invest in a new plant in Russia.

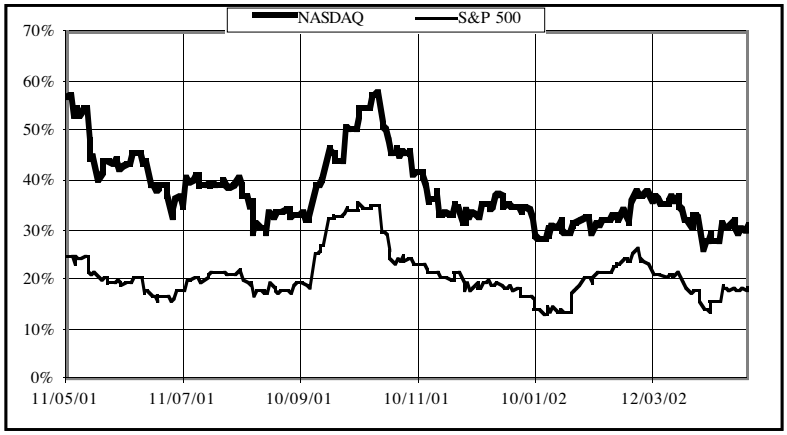
Taken from an investment bank: "From a methodological viewpoint, if this project had to be taken into account, its net present value should be assumed to be nil. The most reasonable approach would be to assume that the investment is expected to deliver a return that is equal to financial markets expectations, which implies a net present value equal to zero."

Taken from a professor at a business school, acting as expert witness in an arbitrage. "By taking into account a future Russian plant project in the valuation, the seller of the shares would benefit from the profits generated by this new project without incurring the related risks, as he would not take part in the future investment."

4.D.2. Considering that a change in economic conditions invalidates signed contracts. A European bank bought a securities company on February 16, 2001. The European bank bought 80% of the shares and gave the current owners a put on the remaining 20% of the shares with an exercise price of 54 million euros (equal per share price as the transaction). The current owners tried to exercise the put in May 2002, but the European bank refused, arguing that: "As, due to specific extraordinary circumstances, the situation of the financial markets and of the world economy in May 2002 was very much worse than on 16 February 2001, we have no obligation to accept the exercise of the put at the agreed exercise price. The unforeseen recession was aggravated by the shock of 11 September 2001, which had both short and medium-term effects, insofar as stock market behavior over the following twelve months was unfavorable and highly volatile." The European bank produced a new valuation of the shares of the securities company on May 2002 that argued that the price of the shares that fallen 86.3% since February 2001.

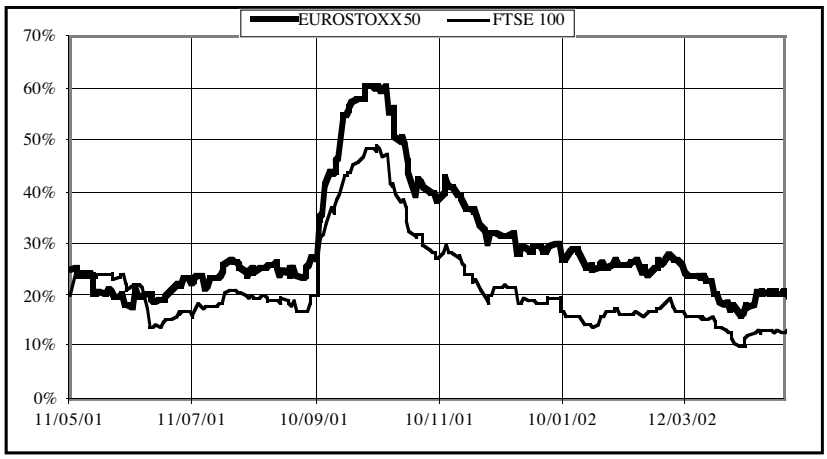
Contracts are signed to be fulfilled. Besides, there are no grounds for the claim that stock market volatility increased significantly after 11 September 2001. Figures 37.4.1 and 37.4.2 show the volatility of the S&P500, Nasdaq, Eurostoxx 50 and FTSE 100. It can be seen that the increase in volatility following September 11, 2001 was short-lived and soon dissipated. By March 2002 the volatility was similar to what it had been before September 11. Consequently, the effect of September 11 did not cause a permanent increase in volatility.

Figure 37.4.1. Annual volatility of the S&P500 and of the Nasdaq. Calculated with daily data of the last 25 days. Period: May 2001 - May 2002.



Source: Thomson Financial Datastream.

Figure 37.4.2. Annual volatility of the Eurostoxx 50 and of the FTSE 100. Calculated with daily data of the last 25 days. Period: May 2001 - May 2002.



Source: Thomson Financial Datastream.

The effect of September 11 on prices was also short-lived. Table 37.4.1 shows what a short time the effect of September 11 on the S&P500, the Nasdaq and other world stock market indexes lasted. It is quite clear that the effect of September 11 did not lead to a permanent increase in volatility or a permanent decrease in prices. Consequently, it cannot be true to say that the market risk (volatility is one measure of this risk) has increased as a result of September 11.

Table 37.4.1. Effect of September 11, 2001 on four stock indexes: S&P 500, Nasdaq, EURO STOXX 50, and FTSE 100

	S&P 500	Nasdaq	EURO STOXX 50	FTSE 100	
10/09/01	1092.5	1695.4	3440.7	5033.7	
11/09/01	1092.5	1695.4	3220.3	4746.0	September 11, 2001
12/09/01	1092.5	1695.4	3260.9	4882.1	
13/09/01	1092.5	1695.4	3293.8	4943.6	
14/09/01	1092.5	1695.4	3091.2	4755.8	
17/09/01	1038.8	1579.6	3205.0	4898.9	
18/09/01	1032.7	1555.1	3189.9	4848.7	
19/09/01	1016.1	1527.8	3105.1	4721.7	
20/09/01	984.5	1470.9	2967.9	4556.9	
21/09/01	965.8	1423.2	2877.7	4433.7	Lowest level after September 11
10/10/01	1081.0	1626.3	3468.3	5153.1	Eurostoxx higher than on September 10
11/10/01	1097.4	1701.5	3510.6	5164.9	FTSE 100 higher than on September 10
15/10/01	1090.0	1696.3	3393.6	5067.3	Nasdaq higher than on September 10
16/10/01	1097.5	1722.1	3455.3	5082.6	S&P 500 higher than on September 10
26/10/01	1104.6	1769.0	3611.9	5188.7	

Source: Thomson Financial Datastream.

4.D.3. Considering that the value of debt is equal to its book value, when they are different. A common assumption in valuations is to consider that the value of debt (D) is equal to its book value (N). However, there are circumstances in which this assumption is not reasonable. For example, when the company has long-term fixed-rate debt and interest rates have increased (decreased), the debt value (D) is lower (higher) than its book value (N).

4.D.4. Not using the correct formulae when the value of debt (D) is not equal to its book value (N). Fernández (2002, page 416) shows that the expression for the WACC, when the value of debt (D) is not equal to its book value (N) is WACC = (E Ke + D Kd – N r T) / (E + D). Kd is the required return to debt and r is the cost of debt.

4.D.5. Including the value of real options without any economic meaning. An example: Table 37.4.2 contains the net present value calculation of a project for a new plant in Brazil for a supplier of automotive interior systems to most of the major car assemblers. Initial outlays amounted to nearly $38 million. The project involved supplying components for 500,000 cars the first year and 850,000 cars the following years. The net present value of the project (given the cost of the new plant and the expected free cash flows) using a WACC of 14.95% is negative: -$ 7.98 million.

Table 37.4.2. Net present value calculation of a project for a new plant in Brazil.
WACC = 14.95%

($ million) in nominal terms	0	1	2	3	4	5	Salvage value
FCF	–37.9	3.5	12.6	10.7	8.5	7.1	3.8
NPV			**–7.98**				

However, the valuator argued that the owner of the plant had additional options that were not included in the net present value calculation:

- Options that come from the future attainment of new supply contracts during the life of the plant (growth options, valued as three European options with strike prices of $5.6, $0.4 and $0.085 million).

- Option to renew initial supply contracts at their expiration date (prolongation option, valued as a European option with strike price of $42.7 million). The salvage value of the project is neither the value of its contract renewal nor the liquidation price of its assets, but the maximum of both.

- Flexibility options: possibility of adapting project costs to the evolution of sales.

- Abandonment option: possibility of abandoning the investment prior to the end of its life. (Valued as an American put option on the future cash flow stream with strike price equal to its salvage value and maturity date the project's life).

Valuing the options and the project, the valuator said that the expanded net present value (value of the plant taking into consideration the real options imbedded in the investment) was as shown in Table 37.4.3. The valuator concluded: "Considering the real options together displays a significant positive expanded NPV for different assumptions about the future evolution of the state variable (number of cars that are produced and assembled in Brazil) and, therefore, validates the optimality of the investment decision.

Table 37.4.3. Expanded net present value of a project for a new plant in Brazil, as a function of the drift rate and of the volatility

	Drift rate		
Volatility	0%	7%	15%
7%	2.4	7.5	15.2
13%	2.5	7.6	15.2
20%	2.8	7.2	13.6

Volatility is the standard deviation of the number of cars that are produced and assembled in Brazil.

Drift rate means the expected growth in the number of cars that are produced and assembled in Brazil.

Questions to the reader: Do the options belong to the company? Do you think that the specification of the options (which depend almost exclusively on the number of cars that are produced and assembled in Brazil) is a good description of them? Would you advise to invest in the project?

4.D.6. Forgetting to include the value of non-operating assets. Taken from a valuation report: "We do not consider in our valuation the value of the shares that the company has in a traded telephone company because this investment is totally unrelated to the industrial and commercial activities of the company." The value of the shares of a company is the present value of the expected equity cash flows plus the current value of the non-operating assets.

4.D.7. Inconsistencies between discount rates and expected inflation. In a valuation report, the WACC (in nominal terms) used was 5.4% and the expected inflation used to forecast the free cash flows was 6%.

4.D.8. Valuing a holding company assuming permanent losses (without tax savings) in some companies and permanent profits in others. In a valuation report, performed by an investment bank, of a holding company that had two subsidiaries, the equity of one subsidiary was valued at $81 million, while the equity of the other was valued at –$33.9. The taxes of the latter were forecasted as zero because the company was assumed to have permanent losses.

4.D.9. Wrong concept of the optimal capital structure. Taken from a valuation report: "The optimal capital structure is the one that maximizes enterprise value (debt value plus equity value). In the context of the Adjusted Present Value, the enterprise value is equal to the value of the unlevered company plus the present value of tax shields. Since the value of the unlevered company is constant and unrelated to leverage, the optimal capital structure is one that maximizes the present value of tax shields." More about the optimal capital structure may be found in chapter 18 of Fernández (2002).

4.D.10. In mature companies, using projected cash flows that are much higher than historical cash flows without any good reason. An example is error 5 in section 37.3.

4.D.11. Making assumptions about future sales, margins, etc. that are inconsistent with the economic environment, industry outlook, or competitive analysis. Taken from a financial consultant's valuation of a platform company: "The following table presents the two extreme scenarios of the evolution of the company's sales.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Optimistic	2.7	3.5	4.2	5.1	6.2	7.4	9.0	10.5	12.1	13.6	15.0
Pessimistic	2.7	3.4	4.1	4.9	5.7	6.8	8.0	9.2	10.5	11.6	12.5

The expected inflation is 2%."

4.D.12. Considering that the ROE is the return to shareholders for non-traded companies. This is quite a common and very mistaken assumption. If ROE is a good approximation of the return to shareholders for non-traded companies it should be also a good approximation for traded companies. The following table shows that the ROE of General Electric has little to do with the return to its shareholders.

General Electric	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	average
Shareholder return	14%	26%	1%	44%	40%	51%	42%	53%	–5%	–15%	–37%	16%
ROE	21%	18%	18%	23%	24%	25%	25%	26%	27%	27%	26%	24%

4.D.13. Considering that the ROA is the return to debt and equityholders. Following the same argument as in the previous point, the ROA has little to do with the return to the shareholders. The ROA (NOPAT / (Ebv +D)) is an accounting ratio, while return is something that refers mainly to changes in expectations.

4.D.14. Using different and inconsistent discount rates for cash flows of different years or for different components of the Free cash flow. An example is error 2 in section 37.3.

4.D.15. Using past market returns as a proxy for required return to equity. Taken from a valuation performed by an institution: "The opportunity cost of investing in the company could be the return of an investment in the stock exchange. As an indicator of the return of the stock exchange, we use the S&P 500 index, but with a long time series to eliminate the influence of short-term market movements. S&P 500 as of June 28, 1999 = 1331.35. S&P 500 as of December 28, 2002 = 1457.66.
(1457.66 / 1331.35) – 1 = 9.5%.
Therefore, the estimated annual cost of equity is: (1 + 9.5%)2 – 1 = 19.9%."

4.D.16. Adding the liquidation value and the present value of cash flows. Taken from a valuation performed by an institution: "The minimum value of the shares of the company is $20.1 million, the sum of the liquidation value ($9.6 million) and the present value of expected cash flows ($10.5 million)."

4.D.17. Using ad hoc formulas to value intangibles. Taken from a valuation performed by a financial consultant: "Valuing the intangibles is very difficult. But an approximation could be to quantify the guarantees that the shareholders have given to the banks. The financial debt of the company is about $20 million. We estimate that the bank loans without the shareholders' guarantees could have an additional annual cost of 2.5%. Quantifying this 2.5% along 10 years, the additional financial cost will be about $2 million. Therefore, $2 million is a good approximation of the value of the intangibles."

4.D.18. Arguing that different discounted cash flow methods provide different valuations. All methods always give the same value, as is shown in chapters 17 and 21 of Fernández (2002). This result is logical, since all the methods analyze the same reality under the same hypotheses; they only differ in the cash flows taken as starting point for the valuation.

5. Errors when interpreting the valuation. The following errors arise from forgetting that the value resulting from any valuation is always contingent on a set of expectations (about the future of the company, of the industry, of the country and of the world economy) and on the appraisal about the risk of the company.

5.A. Confusing Value with Price. The value is always contingent on a set of expectations. A company normally will have different values for different buyers. If the price paid in an acquisition is equal to the value for the buyer, then, the value created by the acquisition equals zero. In contrast, do not forget that value is normally a number in an Excel worksheet, while price is very often cash. There is a difference between $20 million cash and $20 million written in an Excel worksheet.

5.B. Asserting that "the valuation is a scientific fact, not an opinion." A valuation has little to do with science. A valuation is always an opinion.

5.C. Assuming that a valuation is valid for everybody. A company normally will have a different value for the buyer and for the seller.

5.D. Assuming that a company has equal value to all buyers. A company normally will have different value for different buyers.

5.E. Confusing strategic value for a buyer with fair market value. The strategic value contains the extra value (normally due to additional cash flow generation) that a given

buyer thinks that he may get from a company on top of what might be "normal" for other buyers.

5.F. Considering that the goodwill includes the brand value and the intellectual capital. Goodwill is just the difference between the price paid and the book value. There are many cases (especially when interest rates are high) in which the price paid is smaller than the book value. An example is section 37.3: the book value of the shares was 10.76 million euros, and the shares were sold for 5 million euros. Does that mean that the brand value of Pepsi or the value of the "intellectual capital" was negative?

5.G. Forgetting that a valuation is contingent on a set of expectations about cash flow generation and about their riskiness. This is of particular importance in some acquisition processes. Example: a bidder's valuation of the shares of a company was $273 million. But there was another bidder that offered $325 million. The CEO of the first company asked its CFO to prepare another valuation with a minimum of $350 million. The CFO increased expected sales, expected margins and expected residual growth and got a valuation of $368 million. The CEO offered $350 million, got the company and organized a celebration party.

6. Organizational errors

6.A. Making a valuation without checking the forecasts given by the client. Very often, the valuator will ask the client for a forecast of cash flows (or a P&L forecast) of the company. And also, very often, the valuator will use this forecast (which sometimes is a letter to Santa Claus or to the Three Kings) without doing any check of its credibility. An example: A soft drinks bottling and distribution company gave an eight-year forecast in which sales doubled every four years. However, headcount was assumed to remain constant and there were no significant investments.

6.B. Assigning a valuation to an investment bank and not having any involvement in it. A quite common error is to assign a valuation to an investment bank and wait for the valuation report. Obviously, any such valuation is only the value of the company according to the investment bank's forecast (of the economy, of the industry and of the company) and according to the investment bank's appraisal of the riskiness of the company.

6.C. Involving only the finance department in the valuation of a target company. To get a decent valuation, it is necessary to get the sales, production, marketing, personnel, strategy, and legal departments involved.

Appendix 1

75 COMMON AND UNCOMMON ERRORS IN COMPANY VALUATION

List of errors

1. Errors in the discount rate calculation and about the riskiness of the company

A. Wrong risk-free rate used for the valuation
   1. Using the historical average of the risk-free rate.
   2. Using the short-term Government bond rate.

B. Wrong beta used for the valuation
   1. Using the historical industry beta, or the average of the betas of similar companies, when the result goes against common sense.
   2. Using the historical beta of the company when the result goes against common sense.
   3. Assuming that the beta calculated from historical data captures the country risk.
   4. Using wrong formulae for levering and unlevering the beta.
   5. Arguing that the best estimation of the beta of a company from an emerging market is the beta of the company with respect to the S&P 500.
   6. When valuing an acquisition, using the beta of the acquiring company.

C. Wrong market risk premium used for the valuation
   1. The required market risk premium is equal to the historical equity premium.
   2. The required market risk premium is equal to zero.

D. Wrong calculation of WACC
   1. Wrong definition of WACC.
   2. Debt to equity ratio used to calculate the WACC is different from the debt to equity ratio resulting from the valuation.
   3. Using discount rates lower than the risk-free rate.
   4. Using the statutory tax rate instead of the effective tax rate of the levered company.
   5. Valuing all the different businesses of a diversified company using the same WACC (same leverage and same Ke).
   6. Considering that WACC / (1-T) is a reasonable return for the stakeholders of the company.
   7. Using a wrong formula for the WACC when the value of debt is not equal to its book value.

E. Wrong calculation of the value of tax shields
   1. Discounting the tax shield using the cost of debt or the required return to unlevered equity.
   2. Odd or ad-hoc formulas.

F. Wrong treatment of country risk
   1. Not taking the country risk into account, arguing that it is diversifiable.
   2. Assuming that a disaster in an emerging market will increase the beta of the country's companies calculated with respect to the S&P 500.
   3. Assuming that an agreement with a Governmental Agency eliminates the country risk.
   4. Assuming that the beta provided by Market Guide with the Bloomberg adjustment incorporates the illiquidity risk and the small cap premium.

G. Including an illiquidity, small-cap, or specific premium when it is not appropriate.

2. Errors when calculating or forecasting the expected cash flows

A. Wrong definition of the cash flows
   1. Forgetting the increase in Working Capital Requirements when calculating Cash Flows.
   2. Considering the increase in the company's cash position or financial investments as an equity cash flow.
   3. Errors in the calculation of the taxes that affect the FCF.
   4. Expected Equity Cash flows are not equal to expected dividends plus other payments to shareholders (share repurchases, …).
   5. Considering net income as a cash flow.
   6. Considering net income plus depreciation as a cash flow.

B. Errors when valuing seasonal companies
   1. Wrong treatment of seasonal working capital requirements.
   2. Wrong treatment of stocks that are cash equivalent.
   3. Wrong treatment of seasonal debt.

C. Errors due to not projecting the balance sheets
   1. Forgetting balance sheet accounts that affect the cash flows.
   2. Considering an asset revaluation as a cash flow.
   3. Interest expenses not equal to D Kd.

D. Exaggerated optimism when forecasting the cash flows.

3. Errors in the calculation of the residual value

A. Inconsistent Cash Flow used to calculate a perpetuity.
B. The Debt to equity ratio used to calculate the WACC to discount the perpetuity is different from the Debt to equity ratio resulting from the valuation.
C. Using ad hoc formulas without any economic meaning.
D. Using arithmetic averages instead of geometric averages to assess growth.
E. Calculating the residual value using a wrong formula.

4. Inconsistencies and conceptual errors

A. Conceptual errors about the free cash flow and about the equity cash flow
   1. Considering the cash in the company as an equity cash flow when the company has no plans to distribute it.
   2. Using real cash flows and nominal discount rates or viceversa.
   3. The free cash flow and the equity cash flow do not accomplish $ECF = FCF + \Delta D - Int\ (1\text{-}T)$.

B. Errors when using multiples
   1. Using the average of multiples extracted from transactions executed over a very long period of time.
   2. Using the average of transactions multiples that have a wide dispersion.
   3. Using multiples in a way that is different from their definition.
   4. Using a multiple from an extraordinary transaction.
   5. Using ad hoc valuation multiples that go against common sense.

C. Time inconsistencies
   1. Assuming that the equity value will be constant over the next five years.
   2. The Equity value or the Enterprise value do not accomplish the time consistency formulas.

D. Other conceptual errors
   1. Not considering cash flows resulting from future investments.
   2. Considering that a change in economic conditions invalidates signed contracts.
   3. Considering that the value of debt is equal to its book value when they are different.

4. Not using the correct formulas when the value of debt is not equal to its book value.
5. Including the value of real options without any economic meaning.
6. Forgetting to include the value of non-operating assets.
7. Inconsistencies between discount rates and expected inflation.
8. Valuing a holding company assuming permanent losses (without tax savings) in some companies and permanent profits in others.
9. Wrong concept of the optimal capital structure.
10. In mature companies, using projected cash flows that are much higher than historical cash flows without any good reason.
11. Making assumptions about future sales, margins, etc. that are inconsistent with the economic environment, industry perspectives, or competitive analysis.
12. Considering that the ROE is the return to shareholders.
13. Considering that the ROA is the return to debt and equityholders.
14. Using different and inconsistent discount rates for cash flows of different years or for different components of the Free cash flow.
15. Using past market returns as a proxy for required return to equity.
16. Adding the liquidation value and the present value of cash flows.
17. Using ad hoc formulas to value intangibles.
18. Arguing that different discounted cash flow methods provide different valuations.

5. Errors when interpreting the valuation

A. Confusing Value with Price.
B. Asserting that "the valuation is a scientific fact, not an opinion".
C. Assuming that a valuation is valid for everybody.
D. Assuming that a company has equal value for all buyers.
E. Confusing strategic value for a buyer with fair market value.
F. Considering that the goodwill includes the brand value and the intellectual capital.
G. Forgetting that a valuation is contingent on a set of expectations about cash flow generation and about their riskiness.

6. Organizational errors

A. Making a valuation without checking the forecasts given by the client.
B. Assigning a valuation to an investment bank and not having any involvement in it.
C. Involving only the finance department in the valuation of a target company.

References

Brealey, R.A. and S.C. Myers (2000), *Principles of Corporate Finance*, sixth edition, McGraw-Hill, New York.

Campa, J.M. and P. Fernández (2003), "Are calculated betas worth anything?", IESE Working Paper.

Copeland, T. E., T. Koller, and J. Murrin (2000), *Valuation: Measuring and Managing the Value of Companies*. Third edition. New York: Wiley.

Damodaran, A. (1994), *Damodaran on Valuation*, John Wiley and Sons, New York.

Damodaran, A. (2001), *The Dark Side of Valuation*, Financial Times-Prentice Hall, New York.

Dimoson, E., P. March and M. Staunton (2002), "Global Evidence on the Equity Risk Premium", *Journal of Applied Corporate Finance*, September.

Durbin, E. and D. Ng (1999), "Uncovering Country Risk in Emerging Market Bond Prices", Board of Governors of the Federal Reserve System, International Finance Discussion Paper: 639, July.

Estrada, J. (2000), "The Cost of Equity in Emerging Markets: A Downside Risk Approach", Emerging Markets Quarterly, Fall, 19-30.

Fernández, P. (2003a), "The value of tax shields is NOT equal to the present value of tax shields". Forthcoming in the *Journal of Financial Economics*.

Fernández, P. (2003b), "How to value a seasonal company discounting cash flows", SSRN Working Paper.

Fernández, P. (2002), *Valuation Methods and Shareholder Value Creation*, Academic Press, San Diego, CA.

Godfrey, S. and R. Espinosa (1996), "A Practical Approach to calculating Costs of Equity for Investment in Emerging Markets", *Journal of Applied Corporate Finance*, Fall, 80-89.

Hamon, J. and B. Jacquillat (1999), "Is there Value-added information in Liquidity and Risk Premiums?", *European Financial Management*, November 1999, vol. 5, no. 3, pp. 369-93.

Kaminsky, G. and S.L. Schmukler (2002), "Emerging Market Instability: Do Sovereign Ratings Affect Country Risk and Stock Returns?", Bank Economic Review, 2002, vol. 16, no. 2, pp. 171-95.

Knetz, P.J. and M.J. Ready (1997), "On the robustness of the size and book-to-market in cross-sectional regressions" *The Journal of Finance*, vol. 52, no. 4, September, pp.1355-1382.

Lessard, D. (1996), "Incorporating Country Risk in the Valuation of Offshore Projects", *Journal of Applied Corporate Finance*, Fall, 52-63.

Mehra, R. (2003), "The equity premium: Why is it a puzzle?", *Financial Analysts Journal*, January/February, pp. 54-69.

Mehra, R. and E. Prescott (1985), "The equity premium: A puzzle", *Journal of Monetary Economics* 15(2), pp. 145-161.

Penman, S.H. (2001), *Financial Statement Analysis and Security Valuation*, New York, McGraw-Hill.

Ruback, Richard S. (1986), "Calculating the Market Value of Risk-Free Cash Flows", *Journal of Financial Economics* (March), pp. 323-339.

Ruback, R. (1995), "A note on capital cash flow valuation", Harvard Business School, Case No. 9-295-069.

Ruback, R. (2002), "Capital cash flows: a simple approach to valuing risky cash flows", *Financial Management* 31, pp. 85-103.

Scholes, M. and J.T. Williams (1977), "Estimating Betas from Nonsynchronous Data", *Journal of Financial Economics*, Dec. 1977, vol. 5, no. 3, pp. 309-27.

Siegel, Jeremy (1998), *Stocks for the Long Run* (2nd ed.), New York, Irwin.

Siegel Jeremy J., (1999), "The Shrinking Equity Premium", *Journal of Portfolio Management*, Fall, pp. 10–17.

Stowe, J.D., T.R. Robinson, J.E. Pinto, and D.W. McLeavey (2002), *Analysis of Equity Investments: Valuation*, Association for Investment Management and Research, Baltimore.

Wang, X. (2000), "Size Effect, Book-to-Market Effect, and Survival", *Journal of Multinational Financial Managemen*t (10), Sept.-Dec, pp. 257-73.