

Aportes de AOF:

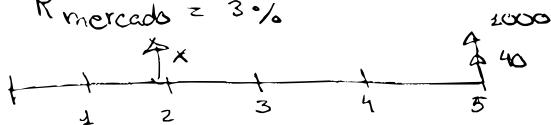
Ejercicio 2: Valoración hoy ($t=2$)

- Nominal = 2000 €

- Nº Años = 5

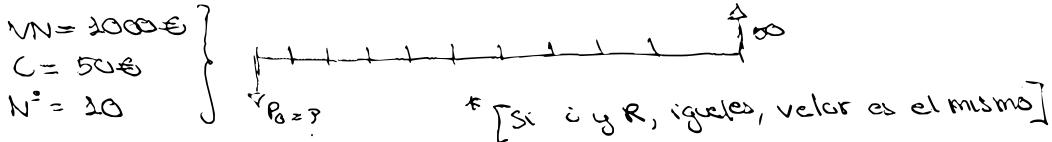
- i(Canuel) = 4%

- R mercado = 3%



$$P_2 = 40 \cdot a_{3|10\%} + \frac{1000}{1.03^3} = \frac{40}{1.03} + \frac{40}{1.03^2} + \frac{40}{1.03^3} \Rightarrow \boxed{1028.29}$$

Ejercicio 2: Valoración de obligaciones



a) Precio en la fecha emisión:

$$R = 5\% \Rightarrow P_0 = 50 \cdot a_{30|10\%} + \frac{1000}{1.05^{30}} = 2000$$

b) En el año 2

$$R = 5\% \Rightarrow P_2 = 50 \cdot a_{29|10\%} + \frac{1000}{1.05^{29}} = 2000$$

c) Precio sucesivos años

$$R = 4\% \Rightarrow P_0 = 50 \cdot a_{30|10\%} + \frac{1000}{1.04^{30}} \Rightarrow 1082.11 \text{ €}$$

$$P_1 = 50 \cdot a_{29|10\%} + \frac{1000}{1.04^{29}} \Rightarrow 1074.35 \text{ €}$$

$$\vdots$$

$$P_2 = 50 \cdot a_{28|10\%} + \frac{1000}{1.04^{28}} \Rightarrow 1069.61 \text{ €}$$

(cuando) $|R < C| \Rightarrow |P > VN|$

c2) Si la R ahora vale 6%

$$R = 6\% \Rightarrow P_0 = 50 \cdot a_{10|0.06} + \frac{1000}{1.06^{10}} = 926.40 \text{ €}$$

$$P_1 = 50 \cdot a_{9|0.06} + \frac{1000}{1.06^9} = 932.98 \text{ €}$$

⋮

$$P_9 = 50 \cdot a_{1|0.06} + \frac{1000}{1.06^1} = 990.57 \text{ €}$$

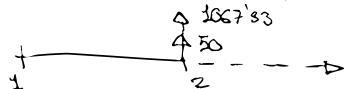
$$P_{10} = 1000 \text{ €}$$

$$\boxed{R > C} \Rightarrow \boxed{P < VN}$$

- R = Tipo de mercado
- C = Cuota de pago o el interés anual



d) La rentabilidad por intereses y plusvalías



$$P_1 = 1074.35 \text{ €} // P_2 = 1067.33 \text{ €}$$

* En el año 2, obtiene cupón de 50€ y además 1067.33€

$$\bullet \text{Tasa rentabilidad} = \frac{\text{Beneficio}}{\text{Inversión}}$$

$$\bullet \text{Rent} \times \text{Intereses} = \frac{50}{1074.35} = 0.046539 \Rightarrow 4.65\%$$

$$\bullet \text{Rent} \times \text{Plus Valía} = \frac{1067.33 - 1074.35}{1074.35} = -0.006534 \Rightarrow -0.65\%$$

$$\bullet \text{Rent Total} = 4.65\% - 0.65\% = 4\%$$

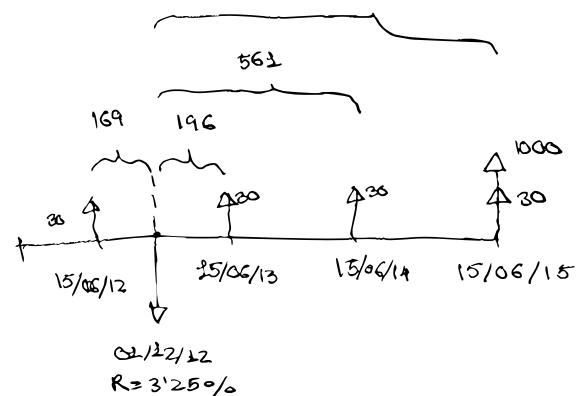
$$1074.35 = \frac{1067.33 + 50}{1+r} \Rightarrow r = 4\%$$

Ejercicio 3: Inversión en obligaciones del Estado

926

01/12/12:

- VN = 2000€
- C = 3% · 2000 = 30€
- V₆₀ = 25/06/2015
- R = 3'25%



$$\left\{ \begin{array}{l} \cdot P_T_{01/12/12} = \frac{30}{(1+0'0325)^{\frac{196}{365}}} + \frac{30}{(1'0325)(1+\frac{196}{365})} + \frac{1030}{(1'0325)^{\frac{926}{365}}} \rightarrow (2+\frac{196}{365}) \\ \cdot P_{T01/12/12} = [30 \cdot a_{3,10'0325} + \frac{1000}{1'0325^3}] \cdot (1'0325)^{\frac{196}{365}} \end{array} \right.$$

$$P_{T01/12/12} \Rightarrow \boxed{3007'77 \text{ €}}$$

$$\boxed{\text{Precio Tot} = P_{\text{EXCUP}} + CC}$$

$$CC_{01/12/12} = \frac{30}{365} \cdot 169 \Rightarrow \boxed{13'89 \text{ €}}$$

$$P_{\text{EXCUP}} = 3007'77 - 13'89 = \boxed{2993'89 \text{ €}}$$

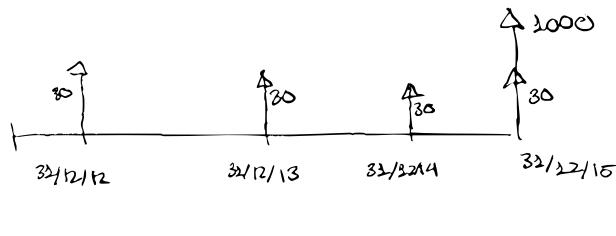
Ejemplo:

$$VN = 2000 \text{ €}$$

$$C = 3\% \cdot 2000 = 30 \text{ €}$$

$$V_{EG} = 32/22/25$$

$$R = 3\%$$



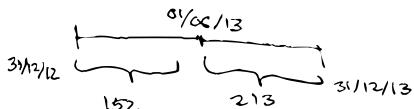
2. Caso 31/12/12

$$P_{31/12/12} \Rightarrow 30 \cdot a_{31|0'03} + \frac{2000}{0'03} = 2000$$

$$CC_{31/12/12} \Rightarrow 0 \Rightarrow P_{EXC} = P_f$$

2. Caso 01/03/13

$$P_{01/03/13} = \left[30 \cdot a_{31|0'03} + \frac{1000}{1'03^3} \right] \cdot (1'03)^{\frac{364}{365}} = 2012'39 \text{ €}$$



$$\left. \begin{array}{l} CC = \frac{30}{365} \cdot 202 = 12'49 \text{ €} \\ P_{EXC} = 2012'39 - 12'49 = 1999'90 \text{ €} \end{array} \right\}$$

3. Caso 30/12/13

$$P_{30/12/13} \Rightarrow \left[30 \cdot a_{31|0'03} + \frac{2000}{1'03^3} \right] \cdot (1'03)^{\frac{364}{365}} = 2029'92 \text{ €}$$

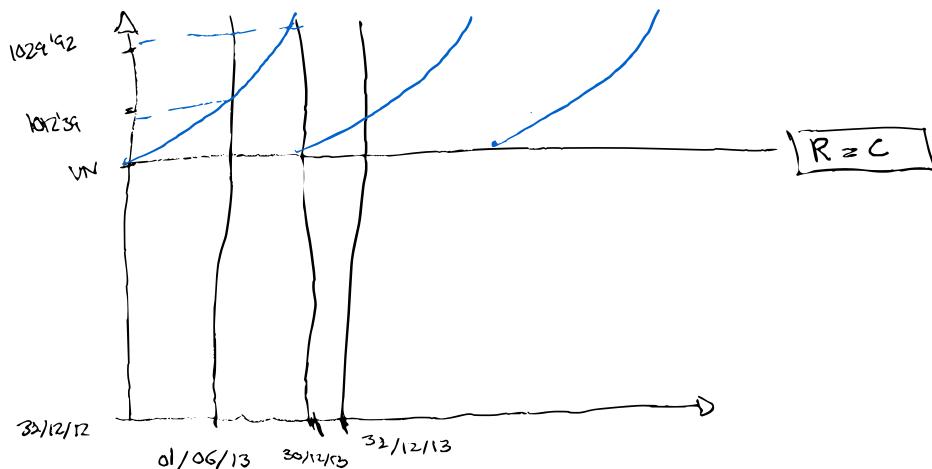


$$\left. \begin{array}{l} CC = \frac{30}{365} \cdot 364 = 29'91 \text{ €} \\ P_{EXC} = 2029'92 - 29'91 = 1999'99 \text{ €} \end{array} \right\}$$

4. Caso 32/22/13

$$P_{31/12/13} \Rightarrow [30 \cdot a_{2/103} + 1000 / 1'03^2] = 2000 \text{ €}$$

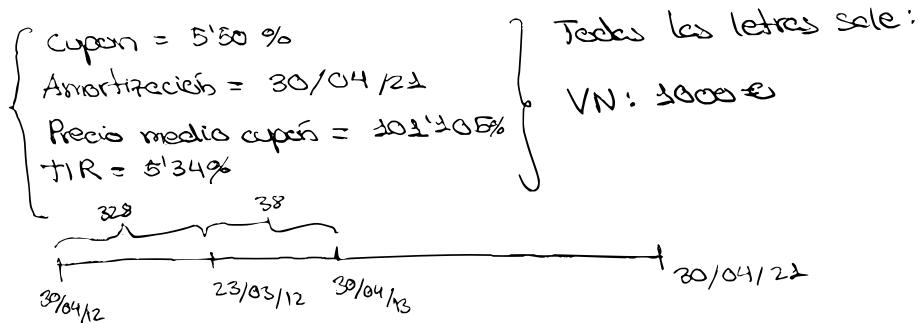
* Por tanto se nos queda este gráfico:



* Ejercicios para casa 1 y 2:

Relación ejercicios Tema 2:

2. Estimaciones a 23/03/12:



a) Cuanto se ha pagado por la obligación:

$$P_{\text{Total}} = P_{\text{EXC}} + CC_{30/04/2012}$$

$$\text{Cupon} = 5'5 \% \cdot 2000 = 55 \text{ €}$$

$$CC_{30/04/12} = \frac{55}{365} \cdot 328 \Rightarrow 49'2739 \text{ €}$$

$$P_{\text{EXC}} = 301'105 \% \cdot 2000 \text{ €} = 3031'05 \text{ €}$$

$$\boxed{P_T = 3060'3239 \text{ €}}$$

$$b) 3060'3239 \text{ €} = \left[55 \text{ €} \cdot a_{10 | \text{TIR}} + \frac{1000}{(1+\text{TIR})^{10}} \right] (1+\text{TIR})^{\frac{328}{365}}$$

2. Emission = 02/02/22 a la par \rightarrow Pemision = VN
 $\Rightarrow 3000 \text{ €}$

$$VN = 3000 \text{ €}$$

Cupón = 5% anual pagadero por semestres

$$\hookrightarrow \text{Cupón} = \frac{5\%}{2} \cdot 3000 = 75 \text{ €}$$

Fechas de cupón = 30/06/X y 30/12/X

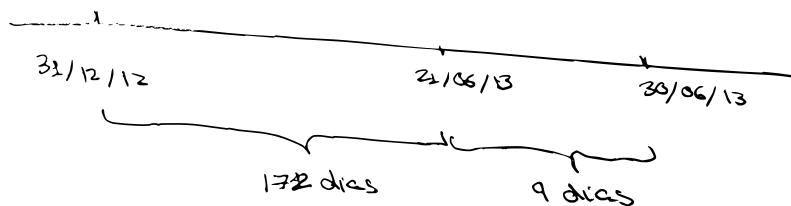
Vencimiento = 01/02/2023

$$P_{EXC} \Rightarrow 108\%$$

a) $P_T = P_{EXC} + CC_{21/06/13} = 3240 + 75'25 = 3322'20 \text{ €}$

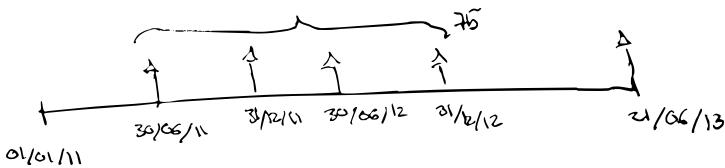
$$P_{EXC} = 108\% \cdot 3000 \Rightarrow 3240 \text{ €}$$

$$CC_{21/06/13} = \frac{75}{382} \cdot 272 = 75'25 \text{ €}$$



$$3322'25 = [75 \cdot a_{181|TIR} + \frac{3000}{(1+TIR)^{181}}] \cdot (1+TIR)^{\frac{172}{181}}$$

$TIR_{anual} \Rightarrow 3'799\%$



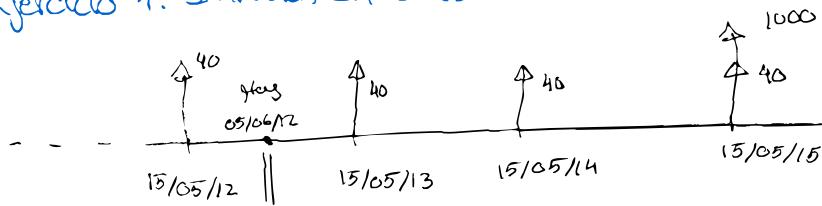
$$\text{Importe venta} = 3355127 - 6'3\% \cdot 3355127 = 3301^{\circ}34 \text{ €}$$

$$3000 = 75 \cdot a_{4|TIR} + \frac{3301^{\circ}34}{(1+TIR)^4 + \frac{172}{181}}$$

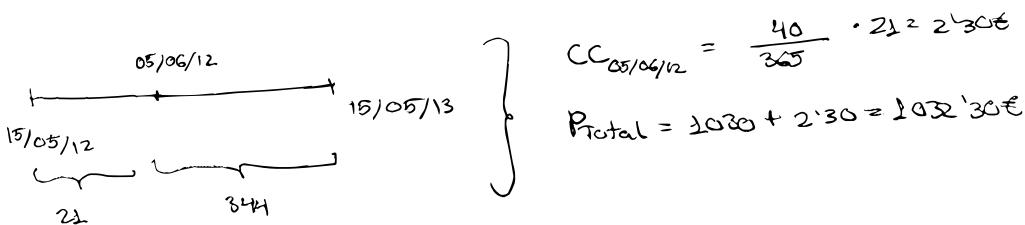
$$3000 = \frac{75}{(1+TIR) \frac{182}{365}} + \dots + \frac{75}{(1+TIR) \frac{730}{365}} + \frac{3301^{\circ}34}{(1+TIR) \frac{902}{365}}$$

$$3301^{\circ}34 =$$

Ejercicio 4: Inversión en bonos del estado



$$P_{EXC} = 303\% \Rightarrow 1000 \cdot 103\% = 1030\text{€}$$



$$1032.30 = \left[40 \cdot a_{3|TIR} + \frac{1000}{(1+TIR)^3} \right] \cdot (1+TIR)^{\frac{21}{365}}$$

\Rightarrow Se sabe que el TIR < 4% \Rightarrow Porque el valor es mayor por lo que se descontaría menos

$$\bullet TIR = 3\%$$

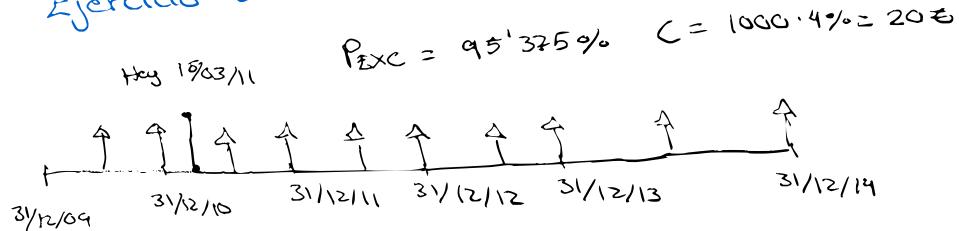
$$\hookrightarrow P_{3\%} = \left[40 \cdot a_{3|0.03} + \frac{1000}{(1.03)^3} \right] \cdot (1+TIR)^{\frac{21}{365}} \Rightarrow 1030.03\text{€}$$

^

$$1032.30\text{€}$$

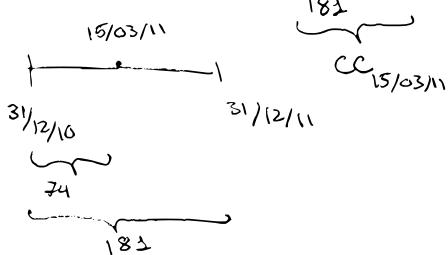
$$\bullet TIR = 2.92\%$$

Ejercicio 5: Calculo del TIR



$$\text{Cupón semestral} = \frac{4\%}{2} \cdot 2000 = 20$$

$$\text{Total} = 953'75 + \underbrace{\frac{20}{182}}_{CC_{15/03/11}} \cdot 74 = 962'93\text{€}$$

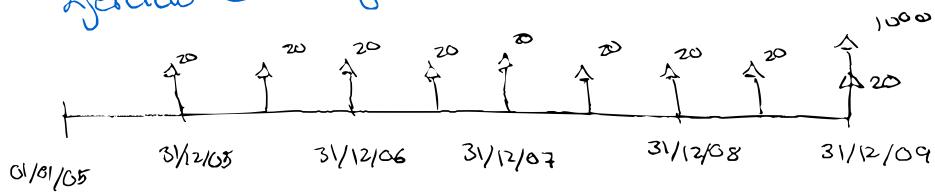


- Calcularemos el TIR:

$$962'93 = \left[20 \cdot a_{8|TIR} + \frac{2000}{(1+TIR)^8} \right] \cdot (1+TIR)^{\frac{74}{182}}$$

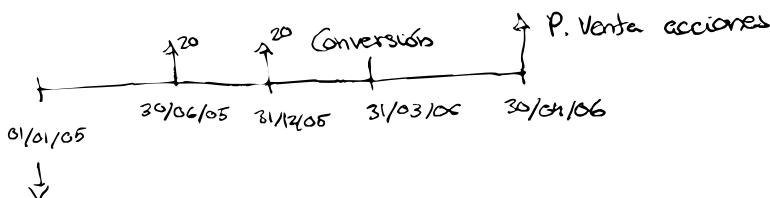
$$\left\{ \begin{array}{l} \bullet TIR \Rightarrow 2'208\% \\ \boxed{\bullet (1+TIR)^8 = (1+TIR_{an})} \\ \bullet 2'027058^2 = 1+TIR_{anual} \Rightarrow \boxed{TIR_{anual} = 5'4265\%} \end{array} \right.$$

Ejercicio 6: Obligaciones convertibles



$$B = V. \text{ Nominal} + C.C$$

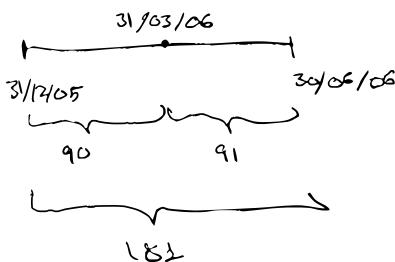
$$A = \underbrace{\text{Cotización media ult. trimestre}}_{7'30 \text{ €}} - 25\%$$



$$P. \text{ Compra} = 2000 \text{ €}$$

$$P. \text{ Venta Unidad} = 7'25 \text{ €}$$

$$\Rightarrow B = V.N + C.C \Rightarrow 2000 + \frac{20}{182} \cdot 90 \Rightarrow 2004'94 \text{ €}$$



$$A = 7'30 - 0'15 \cdot 7'30 = 6'205 \text{ €/acción}$$

$$\text{Tasa conversión} = \frac{2004'94}{6'205} = 322'76 \text{ acciones} \approx 163 \text{ acciones}$$

$$\text{Importe Venta acc} \Rightarrow 322'76 \cdot 7'25 = 2300'63$$

• Para calcular el TIR:

$$2000 = 20 \cdot a_{\frac{1}{1+TIR}} + \frac{2280'02}{(1+TIR)^{2+4/6}}$$

$$2000 = \frac{20}{(1+TIR)^{\frac{180}{365}}} + \frac{20}{(1+TIR)^{\frac{364}{365}}} + \frac{2280'02}{(1+TIR)^{\frac{484}{365}}}$$

TIR excel $\Rightarrow 16'45\%$

Recibe 263 acciones

$$\hookrightarrow 263 \cdot 6'205 = \frac{2022'415}{2009'94} \\ 2'505 \text{ €}$$

{ • Ejercicios 3 - 4 }

Ejercicio 3 - Relación Tema 3:

$$\text{ hoy} = 16/04/13$$



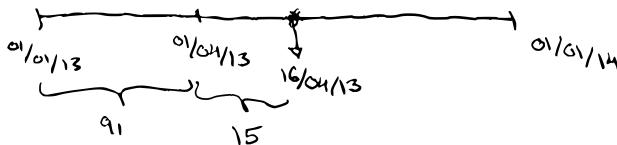
- Valor Nominal = 6000 €
- Cupón trimestral = $6000 \cdot 6\% = 6000 \cdot \frac{6\%}{4} = 90$ €
- Emisión se realizó a la par
- Precio Rescate al 210% $\Rightarrow 6000 \cdot 210\% = 6600$ €
- $R = 4\%$ $\Rightarrow 2\%$ Trimestral nominal
 $\frac{4\%}{4} = 1\%$ anual

→ Primero calcularemos el precio total:

*Como son 8 y ha pasado ya 2 trimestres $\Rightarrow 8 \cdot 4 - 2 = 32$

$$i = (1 + i_T)^k - 1 \Rightarrow 4'06\% \Rightarrow (1 + 0'01)^4 = 1 + \text{TIR}$$

$$i_k = (1 + i)^{1/k} - 1 \Rightarrow \text{Este no lo necesito}$$



$$P_T = \left[90 \cdot a_{3,1/0'01} + \frac{6000}{(1'01)^3} \right] \cdot (1'01)^{\frac{15}{91}} = 6805'54 \text{ €}$$

$$P_{EXC} = P_T - CC = 6790'70 \text{ €}$$

$$CC = \frac{90 \text{ €}}{91} \cdot 15 \Rightarrow 14'84 \text{ €}$$

a) Cuando me piden precios de cotizaciones:

$$\text{Cotización} = \frac{\text{P. Exrupción}}{\text{Valor Nominal}} \cdot 100$$

$$\text{Cotización} = \frac{6790'70\text{€}}{6000} \cdot 100 \Rightarrow 113'17\%$$

b) Si sería conveniente rescatar las obligaciones hoy en día porque cobraremos más:

$$113'17\% > 110\%$$

$$\text{P. Rescate} = 6000 \cdot 110\% = 6600\text{€}$$

$$\rightarrow 6600 + 1484 = 661484\text{€}$$

$$\text{P. Rescate} < \text{P. Mercado} \Rightarrow \text{Perderíamos menos}$$

c) Rentabilidad si rescatamos 20 acciones hoy

$$6000 = [90 \cdot (1+TIR_4) + \frac{6000}{(1+TIR)^{9+\frac{12}{90}}}] \Rightarrow TIR_f = 2'486\%$$

• Cambiamos el TIR:

$$(1+TIR) = (1+TIR_4)^4$$

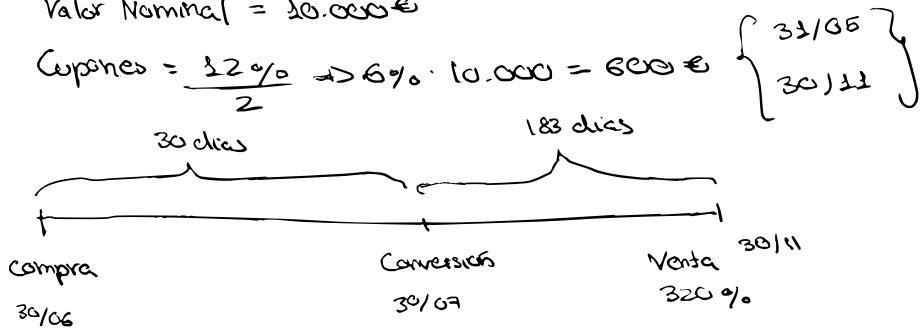
$$TIR_c = (1+TIR_4)^4 - 1 = 10'2212\%$$

Ejercicio 4 - Relación Tema 2:

750 obligaciones

$$\text{Valor Nominal} = 10.000 \text{ €}$$

$$\text{Cupones} = \frac{32\%}{2} \Rightarrow 16\% \cdot 10.000 = 1600 \text{ €}$$



- Se compra al 95% + CC $\Rightarrow P_0 = 95\% \cdot 10.000 + C.C_{30/06}$

- $P_{\text{conversion}} = V.N + C.C$

- \Rightarrow Cada acción $V.N = 500 \text{ €}$

- \Rightarrow Pero el precio de cada acción son $500 \cdot 300\% = 1500$

- $\Rightarrow 1500 - 1500 \cdot 25\% \Rightarrow A = 1275 \text{ €}$

- \Rightarrow Tasa de Conversión $= \frac{B}{A} \rightarrow$ Rendimiento por exceso
(obligacionista pagó)

a) Calculamos el importe de 3 obligaciones

$$P = 95\% \cdot V.N + C.C_{30/06}$$

$$C.C_{30/06} = \frac{600}{183} \cdot 30 = 98'36 \text{ €}$$

$$P = 95\% \cdot 10.000 + 98'36 \Rightarrow 9598'36 \text{ €}$$

Importe de 750 obligaciones

$$P_{\text{total}} = 750 \cdot 9598'36 \Rightarrow$$

$$7.198.770'492 \text{ €}$$

b) Tasa de conversión

$$P_1 \text{ obligaciones} \Rightarrow V.N + C.C_{30/10}$$



$$C.C_{30/10} \Rightarrow \frac{600}{183} \cdot 60 \Rightarrow 196'72€$$

$$P_2 = 10.000 + 196'72 \Rightarrow P_2 = 10196'7213 €$$

$$\frac{B}{A} = \frac{10.196'72}{1235} = 7'99 \sim 8 \text{ acciones}$$

Total de acciones \Rightarrow 8 acciones. 750 obligaciones = 6000 acc

c) Rentabilidad obtenida:

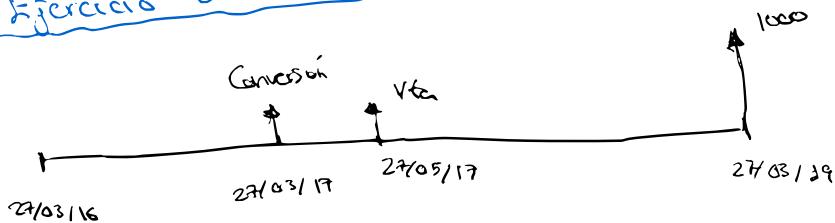
$$P.Venta = 6000 \cdot 320\% \cdot 500 = 9.600.000€$$

• En base anual:

$$7.198.770'49 = \frac{9.600.000}{1 + i \cdot \frac{120}{360}} ;$$

$$\boxed{TIR = 300'66\%}$$

Ejercicio 5 - Relaciones:



a) Las acciones hoy \rightarrow 6€
 Como B es el valor nominal 1000€.

$$\frac{B}{A} = 200 \rightarrow A = 5\text{€/acción}$$

Mercado \rightarrow 6€/acciones \rightarrow 3000€ (Valor conversión)

$$\text{Anterior} \rightarrow 5\text{€/acciones} \xrightarrow{\text{ }} \frac{1000\text{€}}{200\text{€ Beneficio}}$$

b) 5'25 €/acción \rightarrow 2625€

$$2625 = 50 \cdot \alpha_{1,1\text{TIR}} \rightarrow \frac{2625}{(1+1\text{TIR})^{1+\frac{51}{365}}}$$

c) Hoy \rightarrow 4€/acciones }
 TIR \rightarrow 3%

1. A los obligacionistas no les interesa porque
 pierden 2000€ y ganan el valor: 800€

2. No, el precio de rescate es 1100€ mientras
 que el valor de conversión es de 800€

$$50 \cdot \alpha_{210'03} + \frac{1000}{(1+0'03)^2} = 1028'26\text{€}$$

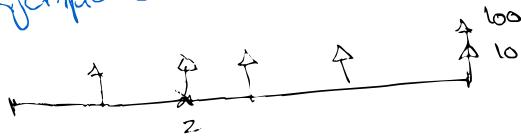
d) $P_{EXC} = 1002'58$

$$P_{Total} = 1002'5 + C.C = 1003'87\text{€}$$

$$C.C = \frac{50}{365} \cdot 10 = 3'27\text{€}$$

$$1003'87 = (50 \cdot \alpha_{1,1\text{TIR}} + \frac{1100}{(1+TIR)^{\frac{355}{365}}}) = 15\%$$

Ejemplo cálculo de rendimiento en la perra



$$P_{\text{Hoy}} = 204,5 \text{ €}$$

$$P_{\text{Rescate}} = 102\% \cdot 300 = 302 \text{ €}$$

- Rentabilidad hasta el vencimiento:

$$204,5 = 20 \cdot a_{5|TIR} + \frac{300}{(1+TIR)^5} \Rightarrow TIR = 8,848\%$$

- Rentabilidad hasta el rescate:

$$204,5 = 10 \cdot a_{2|TIR} + \frac{102}{(1+TIR)^2} \Rightarrow TIR = 8,422\%$$

* Si este último es menor, es indicativo de que la empresa lo rescata

$$R_V > R_R \Rightarrow \text{Rescatamos}$$

$$R_V < R_P \Rightarrow \text{No rescatamos}$$

Tipo Interés de una letra:

⇒ Simple:

$$P = \frac{N}{\left(1 + \frac{n}{360} \cdot c\right)}$$

⇒ Compuesta:

$$P = \frac{N}{\left(1 + \frac{n}{360}\right)^t}$$

Ejercicio 8.2: Subasta de letras del tesoro



- Peticiones no competitivas = 3.000 €
- Volumen Total = 7.000 € } P.Camp = 6.000 €
- Pet. no. comp = 3.000 €

* Miramos si es menor que el precio medio

Precio %	Volumen solicitado	Vol. adj	Vol. adj ex	Precio adj	i. adj
99	1000	1000	1000	98'658 %	2'691 %
98'725	2000	2000	3000	98'658 %	2'691 %
98'520	2500	2500	5500	98'520 %	2'472 %
98'4	1000	500	6000	98'4 %	3'216 %
98'345	500				
98	500				

→ Precio marginal de la subasta

$$P.H.P \Rightarrow 99\% \cdot 1000 + 98'725 \cdot 2000 + 98'520 \cdot 2500 + 98'4 \cdot 500$$

6000

P.H.P $\Rightarrow 98'658 \%$

→ Precio medio de subasta

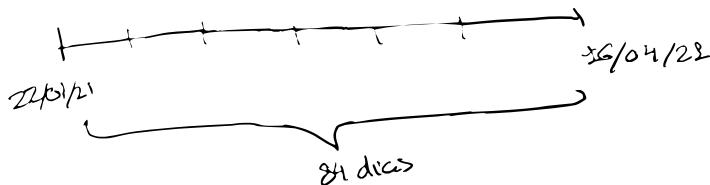
\Rightarrow Interés marginal:

$$984 = \frac{1000}{1 + i_{\text{marg}} \cdot \frac{182}{360}} \Rightarrow i_{\text{marg}} \Rightarrow 3,216\%$$

\Rightarrow Tasa interés medio:

$$986,56 = \frac{1000}{1 + i_{\text{med}} \cdot \frac{182}{360}} \Rightarrow i_{\text{med}} = 2,692\%$$

Ejercicio 8.2:



- Peticiones no competitivas = \bar{x}
- Volumen Total = $7.000 \bar{x}$
- Pet. no. comp = $2.000 \bar{x}$
- P. Comp = $6.000 \bar{x}$

* Miramos si es menor que el precio medio

Tipo. Select(g)	Volumen solicitado	Vol. adj	Vol. adj ac	i. adj	P. adj
-0'598	20	20	20	-0'580	2002'36
-0'594	40	40	60	-0'580	"
-0'589	60	60	120	-0'580	"
-0'586	100	100	220	-0'580	"
-0'573	200	200	420	-0'573	2002'34
-0'571	65	65	465	-0'571	2002'33
-0'561	70				
-0'540	40				

$$i_{\text{medio}} = \frac{-0'598 \cdot 20 + \dots + -0'571 \cdot 65}{485} \Rightarrow -0'580\%$$

$$P_{\text{Medio}} = \frac{1000}{(1 - \frac{0'580 \cdot 84}{360})} \Rightarrow 2002'36 \text{ €}$$

$$P_{\text{Min/Marginal}} \Rightarrow \frac{2000}{(1 - \frac{0'571 \cdot 84}{360})} \Rightarrow 2002'33 \text{ €}$$

Ejercicio 7 - Relación Tema 2:

- 100 millones no competitivos $\Rightarrow 800 - 100 = 700$ millones

P.Sol	Nominal	V.adj	V.ecc	P.adj	i.adj
113'975	100	200	100	111'848	
112'885	200	200	300	111'848	
111'275	250	250	550	111'275	
110'000	450	150	700	110'000	
<u>109'375</u>	<u>400</u>				

a)

- Precio marginal \Rightarrow Último que se acepta: 250

- Precio medio ponderado:

$$P.M.P. = \frac{(223'975 \cdot 100) + (112'885 \cdot 200) + (111'275 \cdot 250) + (110'000 \cdot 250)}{700} = 222'848$$

b) P.marginal = $250\% \cdot 3000 = 3200$ €

$$3200 = 55 \cdot a_{7,1,TIR} + \frac{3000}{(1+i_{ing})^0} = 4'2516\%$$

$\xrightarrow{\text{x } 112'885 \rightarrow \text{se transforma al P.adj}}$

$$c) 222'848 = (55 \cdot a_{7,1,TIR} + \frac{1009'45}{(1+TIR)^3}) \cdot (1+TIR)^{\frac{10}{365}}$$

$$\Rightarrow P_{vta} = 3000 \cdot (1'61245 - 0'003) = 3009'45$$

$$\Rightarrow TIR = 1'7529\%$$

d) $P_{exc} = 3012'45 + CC = 3013'95$ €

$$CC = 55 \cdot \frac{10}{365} = 250$$

$$3013'95 = (55 \cdot a_{7,1,TIR} + \frac{10000}{(1+TIR)^7}) \cdot (1+TIR)^{\frac{10}{365}}$$

$$\begin{array}{l} \text{Importe} \\ \text{Venta} = 2000 - 1'5 \end{array}$$

84 días

$$\left\{ \begin{array}{l} P_{\text{Compra}} = 2002'36 \text{ €} \\ \text{Comisión} = 0'15\% \cdot 2000 = 1'5 \end{array} \right\}$$

$$2002'36 = \frac{998'5}{(1 + \text{Rent. efect}) \frac{84}{365}}$$

$$\Rightarrow \text{Rent. efect} = \left(\frac{998'5}{2002'36} \right)^{\frac{365}{84}} - 1 \Rightarrow -1'236\%$$

Ejercicio 8 - Relación Tema 2:

Peticiones no comp = 423 millones

Peticiones comp = 3023 - 423 = 2598 millones

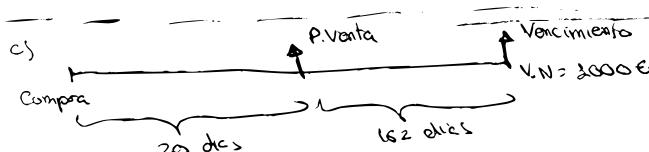
Precio	Volumen	Vol. adj	Vol. ace
99'335	27	27	27
99'135	175	175	202
99'118	216	216	418
99'112	110	110	528
99'102	70	70	698
99'1	20		
99'03	823		
98'725	1929		
98'615	600		

a) P. marginal = $99'102\% \cdot 2000€ = 991'02€$

$$991'02 = \frac{2000}{(1 + i_{mg} \cdot \frac{182}{360})} \Rightarrow 991'02 + i_{mg} \cdot 501'015 = 2000$$

$$i_{mg} = \frac{1000 - 991'02}{501'015} \Rightarrow i_{mg} = 0'017923 \Rightarrow 1'79\%$$

b) P.M.P = $\frac{(99'335 \cdot 27) + \dots + (99'102 \cdot 70)}{598} = 991'297$



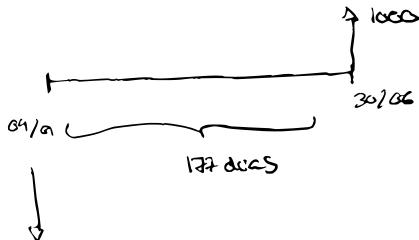
$$P.Venta = \frac{2000}{(1 + 0'0179 \cdot \frac{162}{360})} = 993'386 \quad , \quad P.Compra = 991'29 \cdot 1600 = 991'29€$$

$$991'29 = \frac{993'386}{(1 + TIR) \frac{20}{360}} \Rightarrow 3'689\%$$

Ejercicio 9: Compraventa de Letras del Tesoro contado

$$i_{\text{simple}} = 6'5\% \text{ anual}$$

a) Compra LT al contado



- P. Compra = 962'5
- Importe compra = 964'5
con comisiones

Interés asociado

C.S., 360
sin comisiones

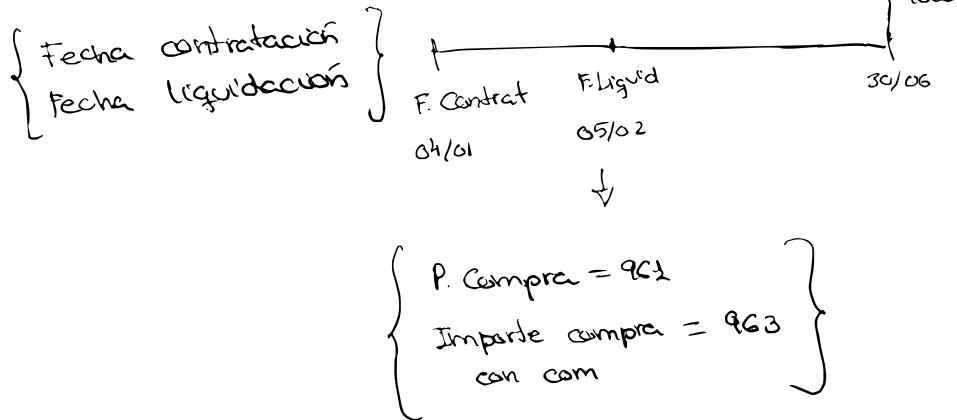
Rent. efectiva

C.C., 365
con comisiones

$$962'5 = \frac{1000}{1 + i \cdot \frac{177}{360}} ; i = 7'92\%$$

$$964'5 = \frac{1000}{(1 + \text{TIR}) \frac{177}{365}} ; \text{TIR} = 7'74\%$$

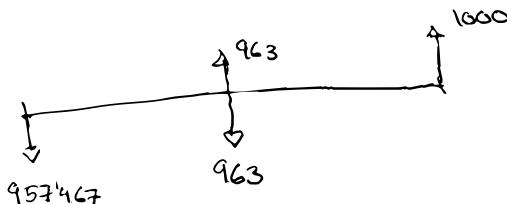
b)



• Interés $962 = \frac{1000}{1 + i \cdot \frac{145}{360}} \Rightarrow i = 10'08\%$

• Rent $963 = \frac{1000}{(1 + TIR) \frac{145}{360}} \Rightarrow TIR = 9'95\%$

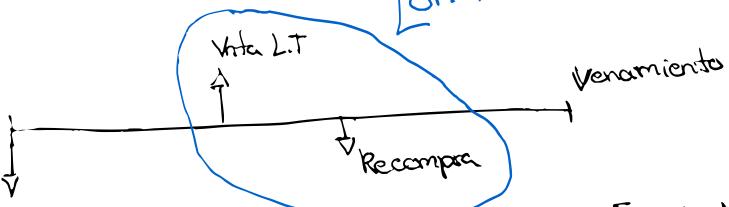
$$\frac{963}{1 + 0'065 \cdot \frac{32}{360}} = 957'467 \text{ €}$$



$957'467 - \frac{1000}{(1 + TIR) \frac{137}{365}} \Rightarrow TIR = 9'378\%$

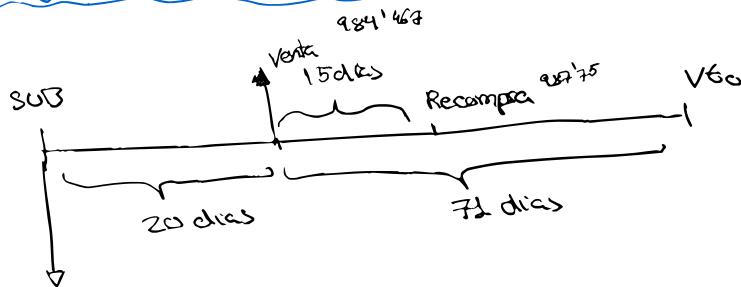
Operación REPO

[OP. Financiación]



*Teniendo financiación => Tiene garantía [Vendo la letra]

Ejercicio 20: Operaciones Repos en L.T.



Compra L.T

$$i = 8'5\%$$

$$P. Compra = \frac{3000}{1 + 0.085 \cdot \frac{91}{360}} \Rightarrow 978'965 \text{ €}$$

$$i_{Repo} = 8'5\% - 0'5\% \Rightarrow 8\%$$

Vista Inversa:

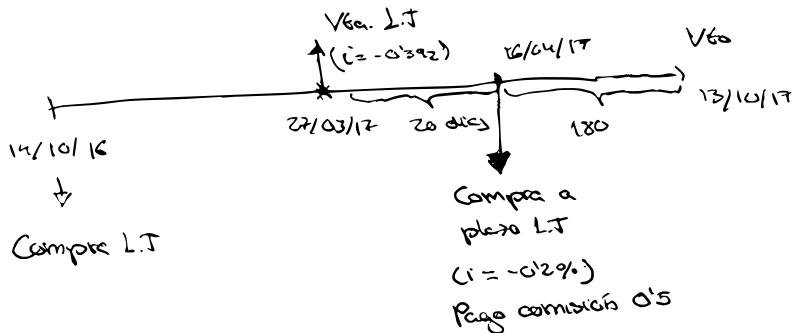


$$P. Venta Repo = \frac{3000}{1 + 0.08 \cdot \frac{71}{360}} \Rightarrow 984'467 \text{ €}$$

$$Precompra Repo = 984'467 \cdot \left(1 + 0.08 \cdot \frac{15}{360} \right) = 987'75 \text{ €}$$

$$984'467 = \frac{987'75}{(1+TIR) \frac{15}{360}} \Rightarrow TIR \approx 8'44\%$$

Ejercicio Examen: Operación Simultánea



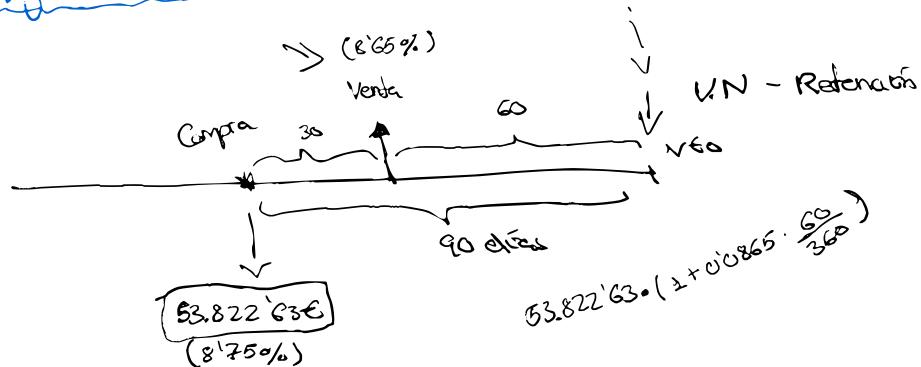
$$\bullet P. Venta = \frac{2000}{1 - 0.00392 \cdot \frac{200}{360}} = 2002.183 \text{ €}$$

$$\bullet P. Compte = \frac{2000}{1 - 0.002 \cdot \frac{180}{360}} = 2002.000 \text{ €}$$

$$2002.183 = \frac{1001.001 + 0.5}{(1 + j) \frac{20}{360}} \Rightarrow -1.234\%$$

1002.183
1001.001
+ 0.5
20 dics

- Ejercicio 11: Páginas de empresa



a) $53.822'63 = \frac{V.N}{(1 + 0'0865 \cdot \frac{60}{360})} \Rightarrow V.N = 55.000\text{€}$

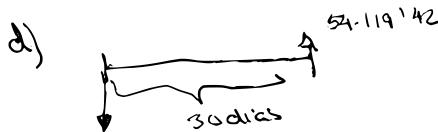
b) Importe a vto. $\Rightarrow 55.000 - 0'25(56.000 - 53.822'63)$
 $\hookrightarrow 54.705'66 \text{ €}$

c) Descontamos los 55.000€:

$$\text{Importe venta}_{30} = \frac{56.000}{1 + 0'0865 \cdot \frac{30}{360}} = 54.218'35\text{€}$$

$\hookrightarrow \text{Importe neto} = 54.218'35 - 0'25(54.218'35 - 53.822'63)$

$\hookrightarrow 54.119'42 \text{ €}$



d) $53.822'63 = \frac{54.119'42}{(1 + TIR)^{\frac{30}{365}}} \Rightarrow TIR = 6'92\%$

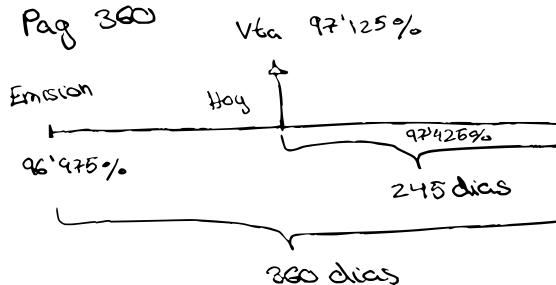
Ejercicio 9:

Operación Financiera 20 días

$$V.N = 6000$$

$$Vto = 245$$

Pag 300



a) Letras Tesoro en 2 años $\Rightarrow i = 2.6\%$.

$$r_{pag} = r_g + \text{Prima riesgos}$$

$$\downarrow$$

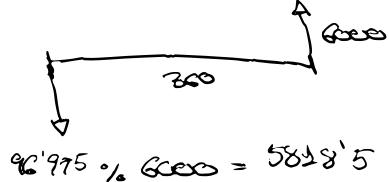
$$\textcircled{?}$$

$$\downarrow$$

$$LT$$

$$\downarrow$$

$$2.6\%$$



$$5828.5 = \frac{6000}{1+i_{pag}} ; \quad i_{pag} = 3.12\%$$

$$\text{Prima riesgo} = 3.12\% - 2.6 = 0.52\%$$

b) Necesidad de financiación = 60.000

$$P.Vta = 97'125\% \cdot 60000 = 5827'5$$

$$Nº \text{ Pagos} = \frac{60000}{5827'5} = 20'296 \sim 22 \text{ pagos}$$

c)

$$5827'5 = \frac{60000}{1+i \cdot \frac{245}{360}} \Rightarrow i = 4'3495\%$$

$$5845'5 = \frac{60000}{1+i \cdot \frac{245}{360}} \Rightarrow i = 4'2289\%$$

d)

$$5827'5$$

$$5845'5$$

$$5827'5 = \frac{5845'5}{(1+TIR) \frac{20}{360}}$$

$$\underline{TIR = 5'7898\%}$$

Ejercicio 10:

• P. marginal = 97'30%

• P. medio. P = 97.417

a) Se compra por el precio medio = 974'17€

Para calcular i. m.g.:

$$974'17 = \frac{1000}{(1 + i_{mg} \cdot \frac{364}{360})} \Rightarrow i_{mg} = 2'622\%$$

b) P. adquisición = 974'17€

R = 2'5%

En 380 días es 98'50%

P. plazo = 9850 €

P. contado = $974'17 \cdot (1 + 0'025 \cdot \frac{180}{360}) = 986'34$ €

• Vemos la diferencia

$$(986'34725 - 985) = 1'34725 \text{ para L.T}$$

Ejercicio 22 - Relación T2:

$$P_{\text{marginal}} = 974'480 \cdot 30000 = 974'8 \text{ €}$$

$$P_{\text{medio}} = 974'622 \cdot 10000 = 974'622 \text{ €}$$

a) $974'8 = \frac{10000}{(1 + c_{\text{mg}})^{\frac{518}{365}}} ; i_{\text{mg}} = 1'7896 \%$

$$974'622 = \frac{10000}{(1 + i_{\text{medio}})^{\frac{518}{365}}} ; i_{\text{medio}} = 1'687 \%$$

b) Como el precio medio es menor que 975€
las letras se pagaron por:

$$P_{LT} = 9750 \text{ € a } 975\%$$

$$9750 = \frac{10000}{(1 + TIR)^{\frac{512}{365}}} \Rightarrow TIR = 1'80 \%$$

c) $P_{\text{venta}} = \frac{10.000}{(1 + 0'02 \cdot \frac{318}{865})} = 9826'40026 \text{ €}$

$$9750 = \frac{9826'40026}{(1 + TIR \cdot \frac{200}{360})} \Rightarrow TIR = 1'435 \%$$

d) $P_{\text{Compra}} = 9750 \text{ €}$

$$P_{\text{control}} = 9750 \cdot (1 + 0'014 \cdot \frac{66}{360}) = 9772'75 \text{ €}$$

$$\Rightarrow P_{\text{plazo}} = 98'30 \% \cdot 30.000 = 9830 \text{ €}$$

$$(9830 - 9772'75) = 57'25 \text{ €}$$

Ejercicio 22:

$$V.N = 5000 \text{ €}$$

$$C = 4\% \cdot 5000 = 200 \text{ €}$$

a) $R = 6\%$

$$P_f = 200 \cdot a_{5|0,06} + \frac{5000}{(1+0,06)^5} = 4578,76 \text{ €}$$

b) Para el 5%:

$$P_{T_{5\%}} = 200 \cdot a_{5|0,05} + \frac{5000}{1,05^5} = 4783,53 \text{ €}$$

Para el 7%:

$$P_{T_{7\%}} = 200 \cdot a_{5|0,07} + \frac{5000}{1,07^5} = 4384,97 \text{ €}$$

c) $P_{\text{venta}} = 200 \cdot a_{4,1|0,07} + \frac{5000}{1,07^4} = 4491,918 \text{ €}$

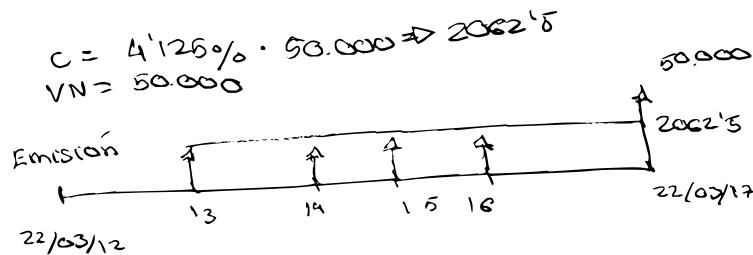
$$P_{\text{compra}} = 4578,76 = 200 \cdot a_{1,1+IR} + \frac{4491,918}{(1+IR)} = 2,41\%$$

d) $P_f = P_{\text{exc}} + C.C \iff 4750 + 98,63 = 4848,63 \text{ €}$

$$5000 \cdot 0,95 = 4750 \quad C.C = \frac{200}{365} \cdot 180 = 98,63$$

• Ejercicio 23:

a)



Precio Excupón 05/06/12 $= 95'493\% \cdot 50.000 = 47.746^{15}$

\downarrow
 $CC_{05/06/12}$

22/03/12 22/03/13 $\Rightarrow \frac{2062^{15}}{365} \cdot 75 = 123'80$

75 días $\Rightarrow P_1 = 48.270^{130}$

b) $48.270^{130} = \left[2062^{15} \cdot a_{51TIR} + \frac{50.000}{(1+TIR)^5} \right] (1+TIR)^{\frac{75}{365}}$

$TIR = 5'20\%$

c)

Ejercicio 24:

$$VN = 6000$$

$$n = 1000$$

P. Solic	Nom. Solic	Nom. Adj	Acum	P. Adj
95'975	20	20	20	95'385
95'885	30	30	50	95'385
94'975	35	35	85	94'975
94'555	25	15	100	94'555
94'375	20			

a)

$$P_{\text{Min}} = P_{\text{Marginal}} = 94'555$$

$$P_{\text{M.P.}} = \frac{20 \cdot 95'975 + 30 \cdot 95'885 + 35 \cdot 94'975 + 25 \cdot 94'555}{100}$$

$$\Rightarrow 95'385$$

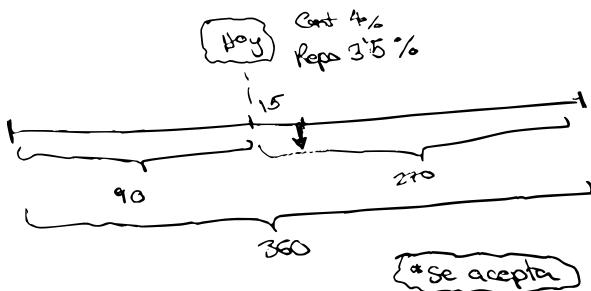
b)

$$P_{\text{Mg}} = 94'555 \% \cdot 6000 = 5673'3 \text{ €}$$

$$94'555 = \frac{200}{2 + \text{Cmg}} \Rightarrow 5673'3 = \frac{6000}{2 + \text{Cmg}}$$

$$\text{Cmg} \Rightarrow 5'7586 \%$$

c)



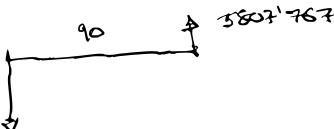
$$P. \text{ Solicitado} = 94'975 \rightarrow P. \text{ Adj} = 94'975$$

$$P. Vta = \frac{6000}{1+0.04 \cdot \frac{270}{360}} = 5825'243$$

$$\text{Comisión} = 0.3\% \cdot 5825'243 = \frac{27'475}{5807'767}$$

P. Vta

neta comisiones



$$P. \text{ Compra} = 94'975\% \cdot 6000 = 5698'5$$

$$5698'5 = \frac{5807'767}{(1+TIR) \frac{90}{360}}$$

$$\boxed{TIR = 8\%}$$

$$P. Vta = \frac{6000}{1+0.035 \cdot \frac{270}{360}} = 5846'53$$

$$P. \text{ Recompra} = 5846'53 \cdot \left(1 + 0.035 \cdot \frac{15}{360} \right) = 5855'05$$

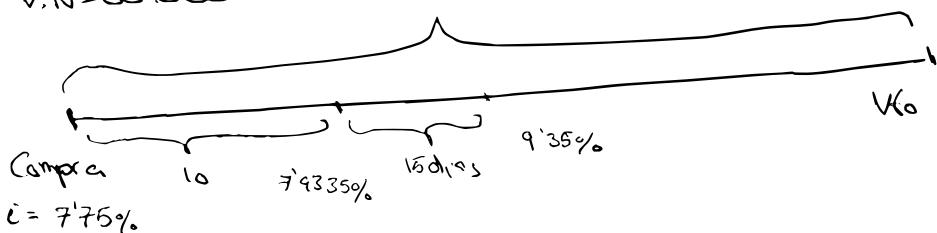
$$5846'53 = \frac{5855'05}{(1+TIR) \frac{15}{360}}$$

$$TIR = 3.6096\%$$

Ejercicio 25 - Relación T2:

V.N = 60000 €

92 días



Comisión del 0,2%

a) N° letras vendidas:

$$P_{vta} \text{ LT} = \frac{3000}{(1 + 0,0775 \cdot \frac{32}{360})} = 982,25 \text{ €}$$

$$N^{\circ}_{LT} = \frac{39.290}{982,25} = 40 \text{ LT}$$

b) Precio re-compra:

$$P_{recompra} = \frac{40.000}{(1 + 0,0935 \cdot \frac{84}{360})} = 39.315,84;$$

$$\hookrightarrow P_{recompra} = 39.315,84 + (39.315,84 \cdot 0,02) = 39.395,84$$

c) Coste efectivo:

$$P_{venta} = \frac{40.000}{(1 + 0,0775 \cdot \frac{32}{360})} = 39.290,00023 \text{ €}$$

$$39.290,00023 = \frac{39.395,84}{(1 + TIR)^{\frac{15}{360}}} \Rightarrow TIR = 6,8\%$$

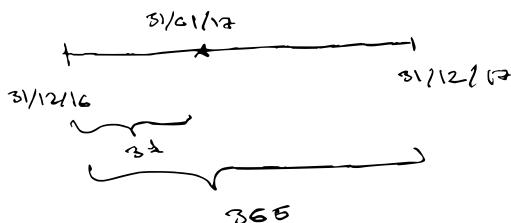
Ejercicio 26:

32/01/17 100 G. Alalea VN = 3000, C = 5% = 150, Vta 31/12/16

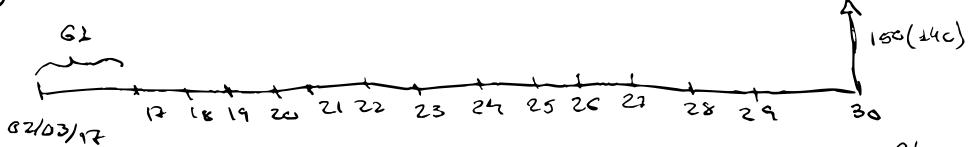
Op. Sim \rightarrow Compra contado P. EXCUPON > 104'456%

\rightarrow Vta a plazo 30 días (f. cadg 02/03/17) al 4'502%

$$a) P. compra_{31/01/17} = 104'456\% \cdot 3000 + \frac{150}{365} \cdot 31 = 3276'42$$



b)



$$P_{02/03/17} = \left[150 \cdot 0'4502 + \frac{3000}{104'456} \right] (1'04'456)^{\frac{31}{365}}$$

$$P_{02/03/17} = 3275'37$$

$$3276'42 = \frac{3275'37}{(1+\text{JIR})^{\frac{30}{365}}} \Rightarrow \boxed{\text{JIR} = -0'40\%}$$

Ejercicio 16:

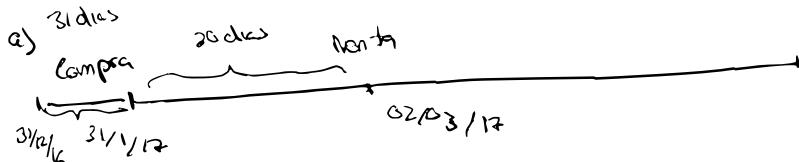
500 Obligaciones

$$P_{ExC} = 105'456 \text{ €}$$

Renta anual 5%

V.N > 3000 €

$$\text{Cupón} = 5\% \cdot 3000 = 150 \text{ €}$$



$$P_{Total} = P_{ExC} + CC \Rightarrow \boxed{3376'419 \text{ €}}$$

$$P_{ExC} = 105'456 \cdot 3000 \Rightarrow 3163'68 \text{ €}$$

$$CC = \frac{150}{365} \cdot 32 = 12'7397 \text{ €}$$

b)

$$P_{venda} = \left[250 \cdot a_{14|0'0405} + \frac{3000}{(1+0'0405)^{14}} \right] \cdot \left(1 + \frac{0'0405}{365} \right)^{61}$$

$\hookrightarrow \boxed{3275'37 \text{ €}}$

c)

$$3276'419 = \frac{3275'37}{(1+TIR) \frac{30}{365}} \Rightarrow TIR = -0'40\%$$

$$d) P_{\text{S}} = P_{\text{Exc}} + CC \Rightarrow 3094'81€$$

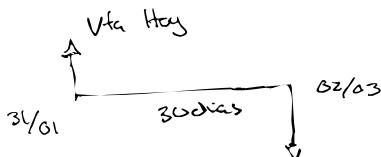
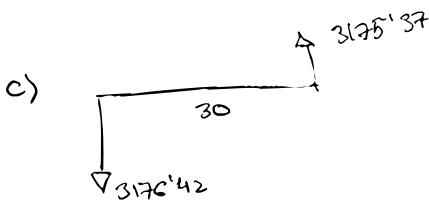
$$P_{\text{Exc}} = (3000 - 102'326) = 3069'75$$

$$CC = \frac{150}{365} \cdot 61;$$

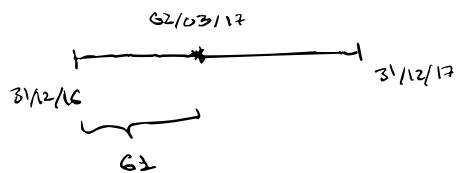
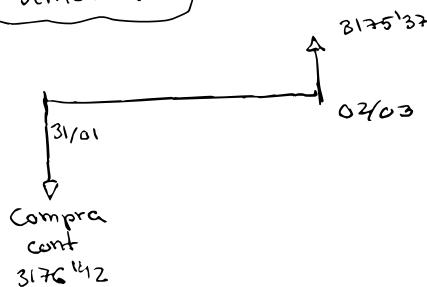
$$P_{\text{venta}} = \left[150 \cdot 0,4105456 + \frac{30690}{(1+0,04504)^{14}} \right] \cdot (10405)^{\frac{31}{365}}$$

$$\hookrightarrow 3163'89€$$

$$3163'89 -$$



• Simultaneo:



$$P_{\text{Compra} \ 02/03} = 202^{\circ} 325\% \cdot 3000 + \frac{250}{365} \cdot G2 = 3094^{\circ} 82$$

$$\underline{t = 32/01/17}$$

$$\begin{aligned} &\text{Compra op.sum} \quad (3276^{\circ} 42) \\ &\frac{3176^{\circ} 42}{0} \end{aligned}$$

$$\underline{t = 02/03/17}$$

$$\begin{aligned} &\text{Compra oblig} \quad (3094^{\circ} 82) \\ &\text{Vta (op.sum)} \quad \frac{3275^{\circ} 37}{86^{\circ} 55} \end{aligned}$$

$\times 100$ obligaciones

$\underline{86568}$

Ejercicio 27:

P-ExC =

07/03/27

OP. Repo → 1 dia, - 0'42%

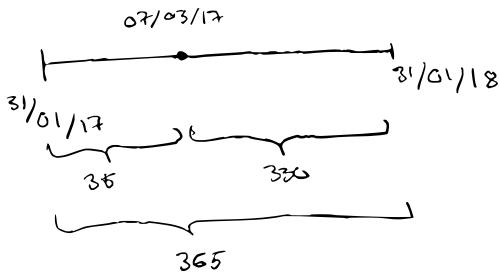
1500 diligencias Estado

Vtg 32/01/37

$$C = 4.20\%$$

$$P. \text{ Compra} = \frac{P_2}{(1+5\%)} \quad$$

$$a) P_{T \text{ 07/03/17}} = \underline{3258'43} + \frac{42}{365} \cdot 35 = 3262'46\text{€}$$



$$365 = \left[42 \cdot q_{26T+1R} + \frac{3000}{(1+TIR)^{20}} \right] (1+TIR) \Rightarrow \boxed{252926\%}$$

$$b) P_1 = \frac{1262^{1.48}}{2^{1.05}} = \frac{1202^{1.34}}{\cancel{1500 \text{ oblag}}}$$

(contra Rcpa)

$$1.803.510^{1.57} \text{ ₽}$$

$$\text{c) Preis rta} = \$202'34 \cdot \left(1 - 0'0042 \cdot \frac{3}{360} \right) = \$202'33$$

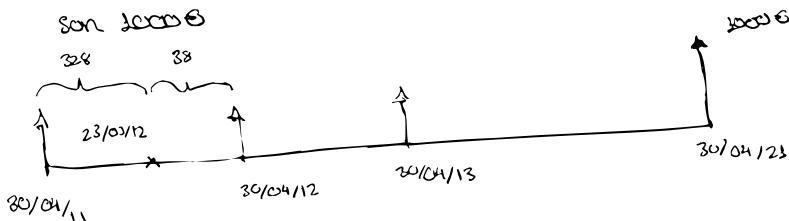
x 1500 ablg

\\$803.484'53€

Ejercicios Tema 2:

Ejercicio 2:

* Generalmente el valor nominal de todas las letras son 1000€



$$\text{Precio medio } P_{\text{exc}} = 102'105$$

$$\text{Cupon} = 5.50\%$$

$$\text{TIR} = 5'34\%$$

$$\Rightarrow \text{Indices} \cdot 5'5\% = 55\text{€}$$

a) Cuanto se ha pagado por la obligación:

$$P_{\text{total}} = P_{\text{exc}} + C.C.$$

$$C.C. = \frac{i \cdot \text{Valor}}{\text{Nº de días por cada cupón}} \cdot N^{\circ} \text{ de transacciones} = \frac{55\text{€}}{365} \cdot 328$$

$$C.C. = 49'2789\text{€}$$

$$P_{\text{exc}} = 102'105\% \cdot 1000\text{€} \Rightarrow 1022'05\text{€}$$

$$P_{\text{total}} = 49'2789 + 1022'05 = 1060'3239$$

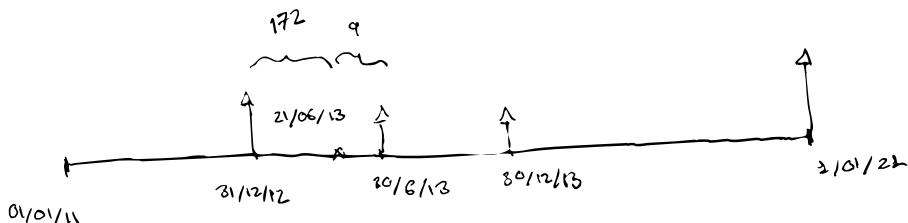
b) Ecuaciones que verifica la TIR:

$$P_{\text{total}} = \left[V. \text{Cupon} \cdot a_{n|TIR} + \frac{1000}{(1+TIR)^n} \right] \cdot (1+TIR)^{-\frac{1}{n}}$$

$$1060'3239 = 55\text{ €} \cdot a_{10|TIR} + \frac{1000}{(1+TIR)^{10}} \cdot \frac{328}{365}$$

$$a_{n|c} = \frac{1 - (1+c)^{-n}}{c}$$

Ejercicio 2:



$$\text{Cupón} = \frac{5\%}{2} \cdot 3000 = 75 \text{ €}$$

$$P_{EXC} = 108\% \cdot 3000 = 3240 \text{ €}$$

a) Plantear la ecuación que plantea la rentabilidad del de mercado

$$P_{Total} = P_{EXC} + CC_{21/06/13} /$$

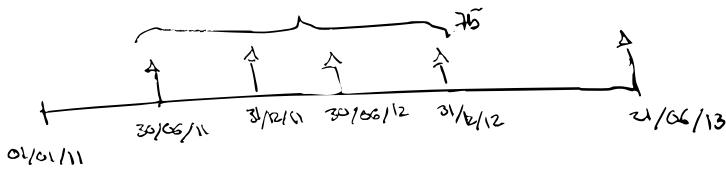
$$CC = \frac{75}{182} \cdot 272 \Rightarrow 75,25 \text{ €}$$

$$P_{Total} = 3240 + 75,25 = 3322,25$$

$$3322,25 = \left[75 \cdot a_{10|TIR} + \frac{3000}{(1+TIR)^{10}} \right] \cdot (1+TIR)^{\frac{172}{182}}$$

$$3322,25 = \left[75 \cdot \frac{1 - (1+TIR)^{-10}}{TIR} + \frac{3000}{(1+TIR)^{10}} \right] (1+TIR)^{\frac{172}{182}}$$

TIR anual $\Rightarrow 3,799\%$



$$\text{Importe vencido} = 3333127 - 0\% \cdot 3333127 = 3301^134 \text{ €}$$

$$3000 = 75 \cdot a_{4|TIR} + \frac{3301^134}{(1+TIR)^4 + \frac{1+2}{1+1}}$$

$$3000 = \frac{75}{(1+TIR)^{\frac{1+3}{2}}} + \dots + \frac{75}{(1+TIR)^{\frac{750}{365}}} + \frac{3301^134}{(1+TIR)^{\frac{902}{365}}}$$

- Ejercicio 2:

$$V_N = 2000 \text{ €}$$

$$C = 50 \text{ €}$$

$$n = 20 \text{ años}$$



a) $R = 5\%$

$$P_0 = 50 \cdot a_{10|0.05} + \frac{1600}{(1.05)^{10}} \Rightarrow 50 \cdot \frac{(1 - 1.05^{-10})}{0.05} + \frac{1600}{1.05^{10}}$$

$$P_0 = 1000 \text{ €}$$

b) $P_1 = 50 \cdot a_{9|0.05} + \frac{1600}{1.05} = 1000 \text{ €}$

* Conclusión si el cupón tiene el mismo interés que el del tipo de mercado ($5\% = 5\%$).

Examen:

Ejercicio 2:

V.N = ~~30000~~ 6

$$C = 0'05\% \cdot 10000 = 0'5\text{€}$$

$$TIR = 0.052\%$$

$$P_{\text{Hog}} = \left[G'5 \cdot a_{2100002} + \frac{1000}{(1 - a_{2100002})^2} \right] e^{-1000 \cdot 048316}$$

Ejercicios 2:

30/06/2020

31/03/2022

$$C_2 \cdot 5\% = 2000 = 55 \text{ €}$$

$$P_i = 3110.8e; \Rightarrow P_t = P_{exc} + C.C;$$

$$C.C = \frac{55}{365} \cdot 91 = 13.71\%$$

$$PExC = 1115'8 - 13'72 = 1102'09 \text{ €}$$

$$P_{\text{correction}} = \frac{1102'09}{1200} \cdot 100 = 91.83\%$$

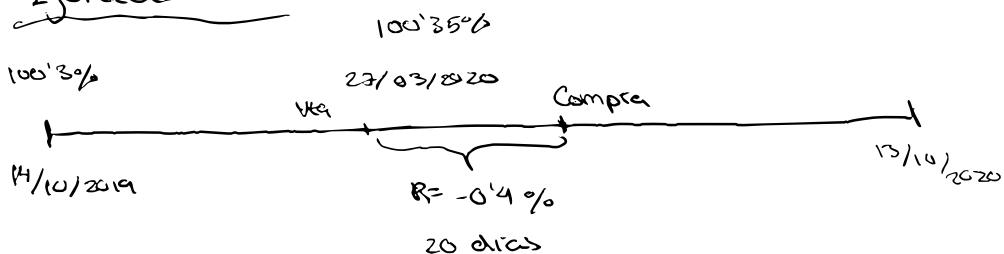
• Ejercicio 3:

Títulos Renta fija \Rightarrow Bonos, LT, obligaciones.

\rightarrow Mantenidas en vto \Rightarrow TIR no varía

\rightarrow Operaciones en el mercado (repo, venta, simul)
 : La TIR varía hacia arriba o hacia abajo.

• Ejercicio 4:



Operación Repo:

$$P_{vta} = 100 \cdot 100'35\% \Rightarrow 1003'5 \text{ €} / (1'05) = 955'72 \text{ €}$$

$$P_{compra} = 955'72 \cdot (1 - 0'004 \cdot \frac{20}{360}) = 955'501$$

$$955'72 = \frac{955'501}{(1 + TIR) \frac{20}{360}} \Rightarrow (1 + TIR) = 0'9959$$

$$TIR = +0'4\%$$

• Ejercicio 5:



$$V.N = 2000 \text{ €}$$

$$C = 2'25\% \cdot 2000 = 25 \text{ €} \quad \text{Prescote} = 2010 \text{ €}$$

$$P_{exc} = 2005'38 \text{ €}$$

$$CC = \frac{250}{365} \cdot 264 = 105'47 \text{ €}$$

$$P_{total} = 2015'92 \text{ €}$$

Si le interesa recuperar dichas obligaciones.

Porque

$$\boxed{\text{Prescote} < P_{total \text{ hoy}}}$$

$$\text{Precios} \begin{cases} \text{mayor - menor} \\ p_{adj} = \min(P.M - P) \end{cases}$$

$$\text{Intercos} \begin{cases} \text{menor - mayor} \\ i_{adj} = \max(F.M - I) \end{cases}$$

• Examen

• Ejercicio 6:-

Vd = 930'21 millones

Tipo	Volumen	Volumen adj	Nº acc	i. adj
-G'453	250	250	250	-0'4489
-G'449	285	285	535	-0'4489
-0'447	180	180	715	-0'447
-0'446	225	215'21	930'21	-0'446
-0'445	210			
-0'443	180			

a) $i_{marginal} = \boxed{-0'446}$

$$i_{med} = \frac{(-0'453 \cdot 250) + (-0'449 \cdot 285) + (-0'447 \cdot 180) + (-0'446 \cdot 215'21)}{930'21}$$

$$\hookrightarrow \boxed{-0'4489}$$

b) $P_{marginal} = \frac{1000}{1 - 0'4489 \cdot \frac{270}{360}} = 1003'386$

$$1003'35 = \frac{1000}{1 - c \cdot \frac{270}{360}}$$

c) $P_{med} = \frac{10000}{1 - 0'4489 \cdot \frac{270}{360}} = 1003'386$

$$P_{442} = 1003'363 \text{ €}$$

$$P_{446} = 1003'356$$

$$\text{Importe total} = 1003'38 \cdot 250.000 + \dots + \Rightarrow 933.344.053'56$$

d) Cuanto el interés marginal es $-0'446\%$, el inversor no se le adjuega nada \Rightarrow No rentabilidad.

c) Cogemos el $-0'447\%$ a 30.000

Vendemos el 26/03/2000 a $-0'4914\%$.

Comisiones $0'2\%$

$$P.vta = \frac{1000}{1 - 0'4914 \cdot \frac{51}{360}} = 2000'6966\$ - (2000'6966 \cdot 0'02)$$

$\hookrightarrow 999'6959\$$

$$P.compr = 1003'363$$

$$1003'363 = \frac{999'6959}{(1+TIR) \frac{51}{360}}$$

$$(1+TIR) = \sqrt[51]{\frac{999'6959}{1003'363}}$$

$$1+TIR = 0'9741$$

$$TIR = 0'999498 - 1 \Rightarrow \boxed{-0'0258\%}$$

• Examen 2020:

• Ejercicio 2:

$$P_{\text{medio}} = 97'5 \%$$

$$P_{\text{marg}} = 97'3 \%$$

$$i_{\text{medio}} \Rightarrow 975 = \frac{3000}{(1+i_{\text{medio}})} \Rightarrow i_{\text{medio}} = \frac{1000 - 975}{975}$$

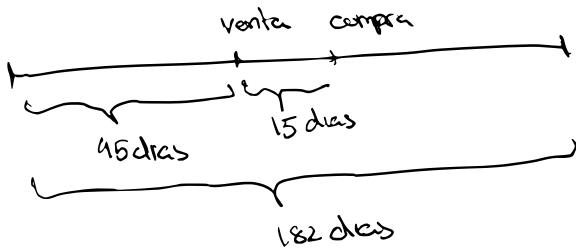
$$\hookrightarrow 0'025 = \boxed{2'5\%}$$

$$i_{\text{marg}} \Rightarrow 973 = \frac{1000}{(1+i_{\text{marg}})} = \frac{1000 - 973}{973} = 0'027 = \boxed{2'7\%}$$

$$P_{\text{compra}} = \frac{1000}{(1'021 \cdot \frac{330}{300})} \Rightarrow 980'83€$$

Podrá comprar $\frac{3000}{980'83} = 3$ Letras

Ejercicio 2:



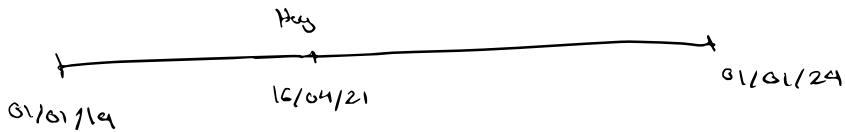
$$P_{\text{venta}} = \frac{1000}{(1 + 0.025 \cdot \frac{157}{360})} = 992.44 \text{ €}$$

$$P_{\text{rec compra}} = 981.52 \cdot (1.02 \cdot \frac{16}{360}) = 993.27 \text{ €}$$

$$993.27 \text{ €} = \frac{1000}{(1 + TIR) \frac{122}{360}} \Rightarrow (1+TIR) = 1.0203$$

$$TIR = 0.020 \Rightarrow \boxed{2\%}$$

• Ejercicio 3:



$$VN = 600 \text{ €}$$

$$j_2 = 4\% \rightarrow i_2 = 2\%$$

$$R = 2\%$$

$$\text{Prescete} = 600 \text{ €}$$

$$C = 32 \text{ €}$$

$$TIR_{anual} = 2\% \Rightarrow TIR_{beneficio} = 2\%$$

$$P = \left[j_2 \cdot q_{8|0.01} + \frac{600}{(1+0.01)^8} \right] \cdot (1+0.01)^{\frac{105}{121}}$$

$$\hookrightarrow P = \boxed{638.497 > 600}$$



Si es conveniente para la empresa.

Ejercicio 2d:

$$(SYV) \Rightarrow 3000 \cdot 1'53 = 4590 \text{ €}$$

$$(BKT) \Rightarrow 5000 \cdot 2'76 = 13.800 \text{ €}$$

$$(ENG) \Rightarrow 3000 \cdot 3'06 = 9180 \text{ €}$$

$$(MHE) \Rightarrow 750 \cdot 25'30 = 18.475 \text{ €}$$

$$\text{Cartera} = 85.985 \text{ €}$$

$$\left(\frac{85.985}{6135} \right) \cdot 1'45 \Rightarrow 8'50 \sim 9 \text{ Contratos}$$

$$(SYV) \Rightarrow 2000 \cdot 1'49 = 2980 \text{ €}$$

$$(BKT) \Rightarrow 5000 \cdot 2'44 \Rightarrow 12.200 \text{ €}$$

$$(ENG) \Rightarrow 3000 \cdot 3'79 \Rightarrow 11.370 \text{ €}$$

$$(MHE) \Rightarrow 750 \cdot 15'72 \Rightarrow 11.782 \text{ €}$$

$$84642'5 \text{ €} \rightarrow \boxed{-1090 \text{ €}}$$

$$(6135 - 5960) \cdot 9 \Rightarrow 1575 \text{ €}$$

$$\overbrace{1.060.000}^{8500 \cdot 10} \cdot 1'25$$

~~20.855~~ £/acc \Rightarrow 20.000 acc \Rightarrow 10

