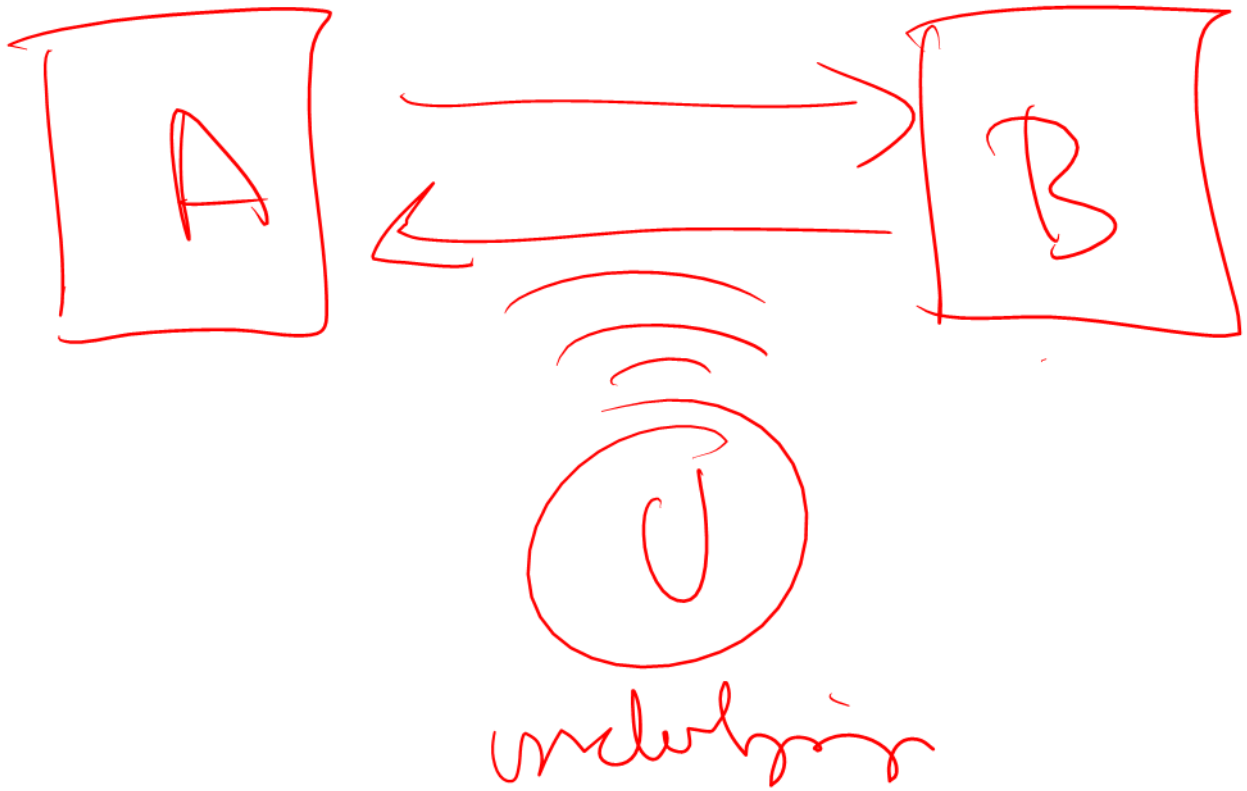
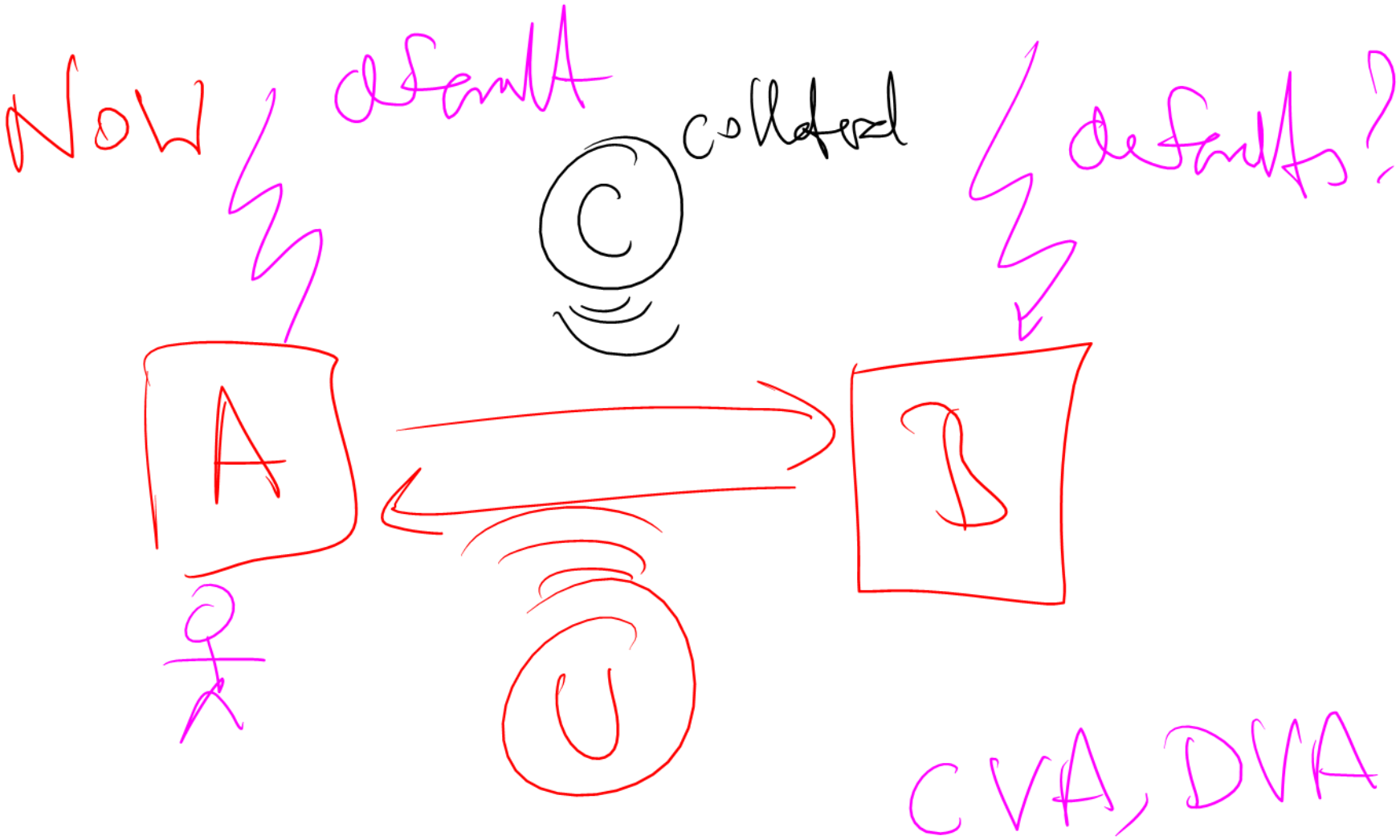
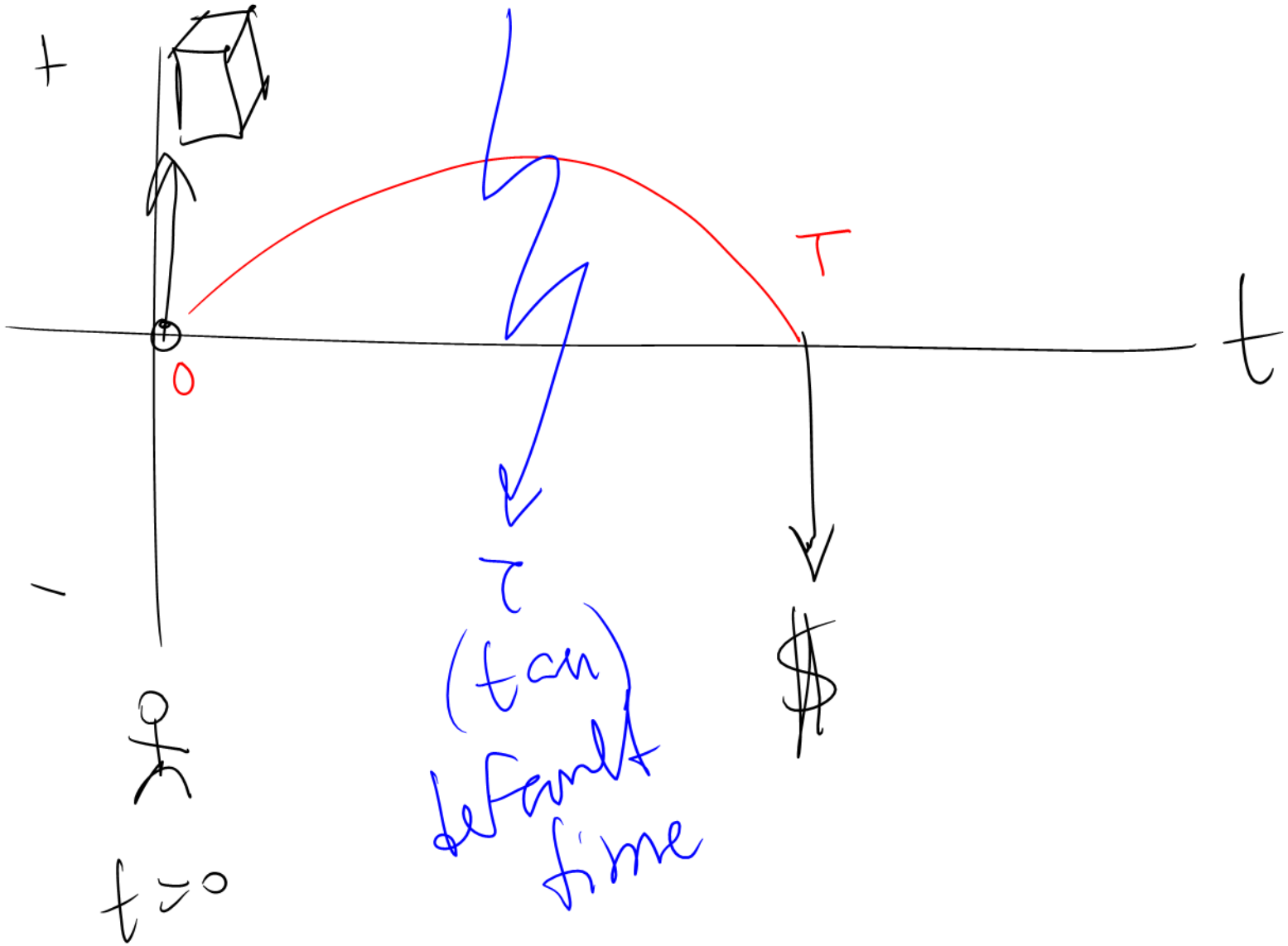
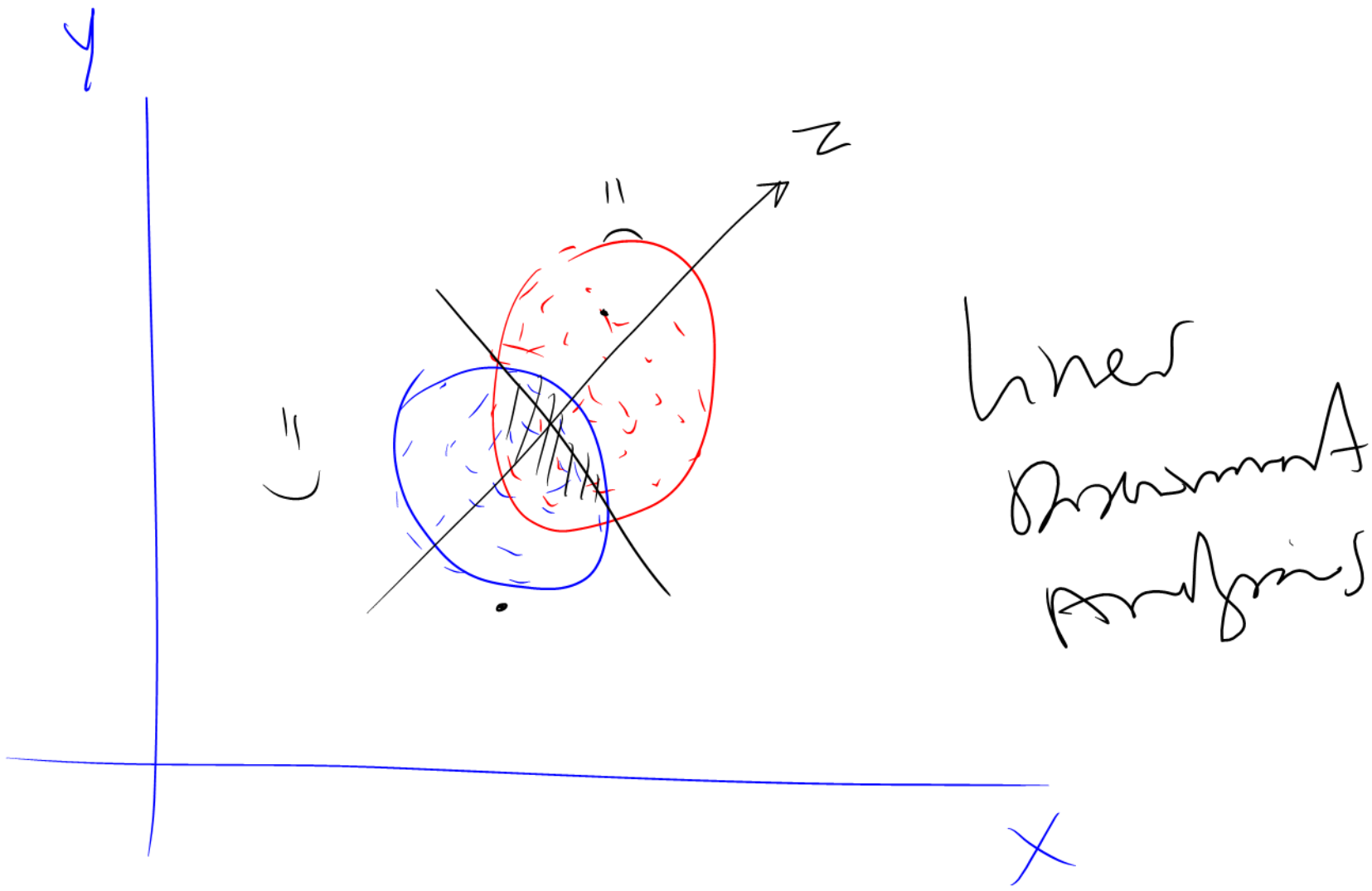
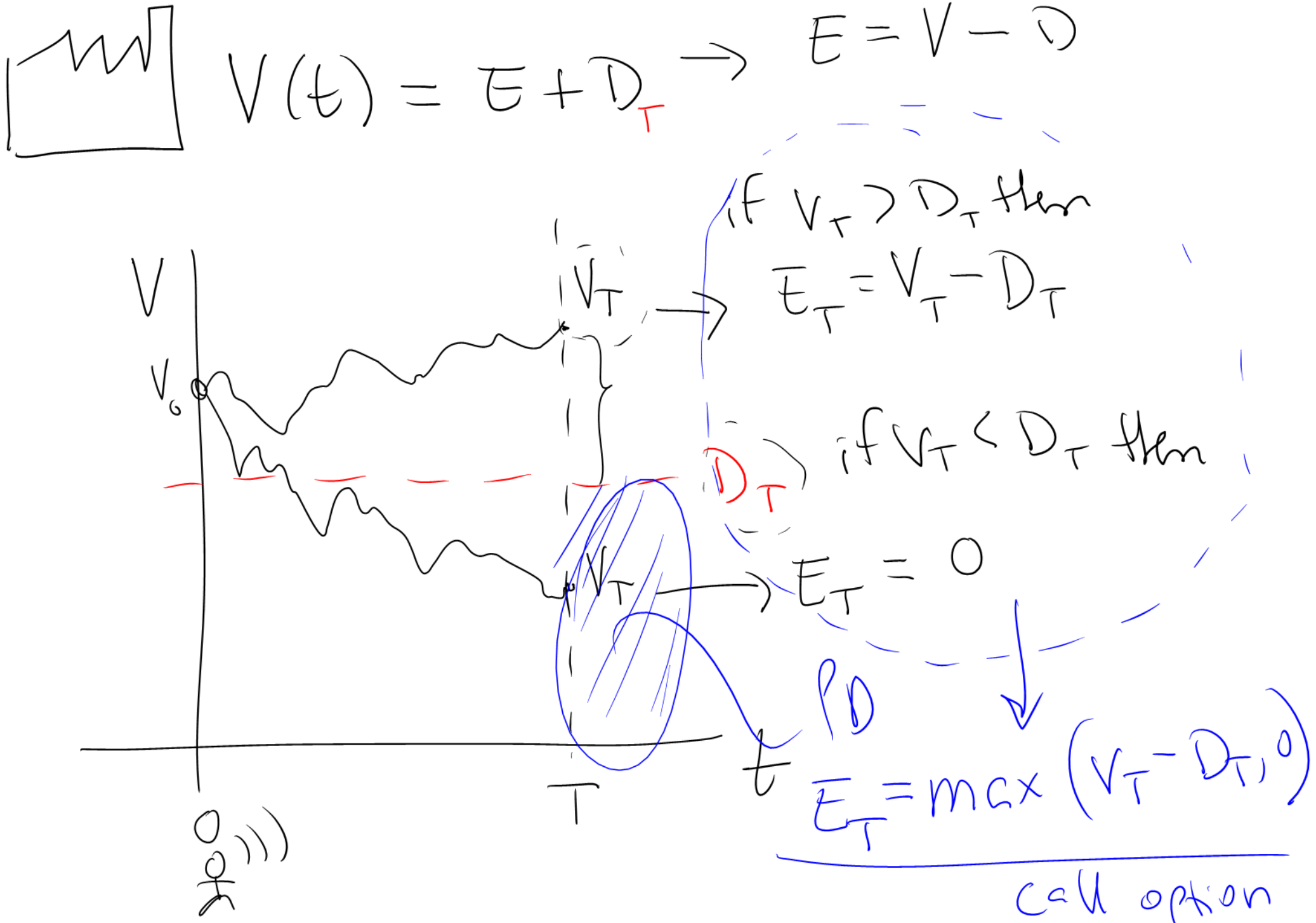
Before

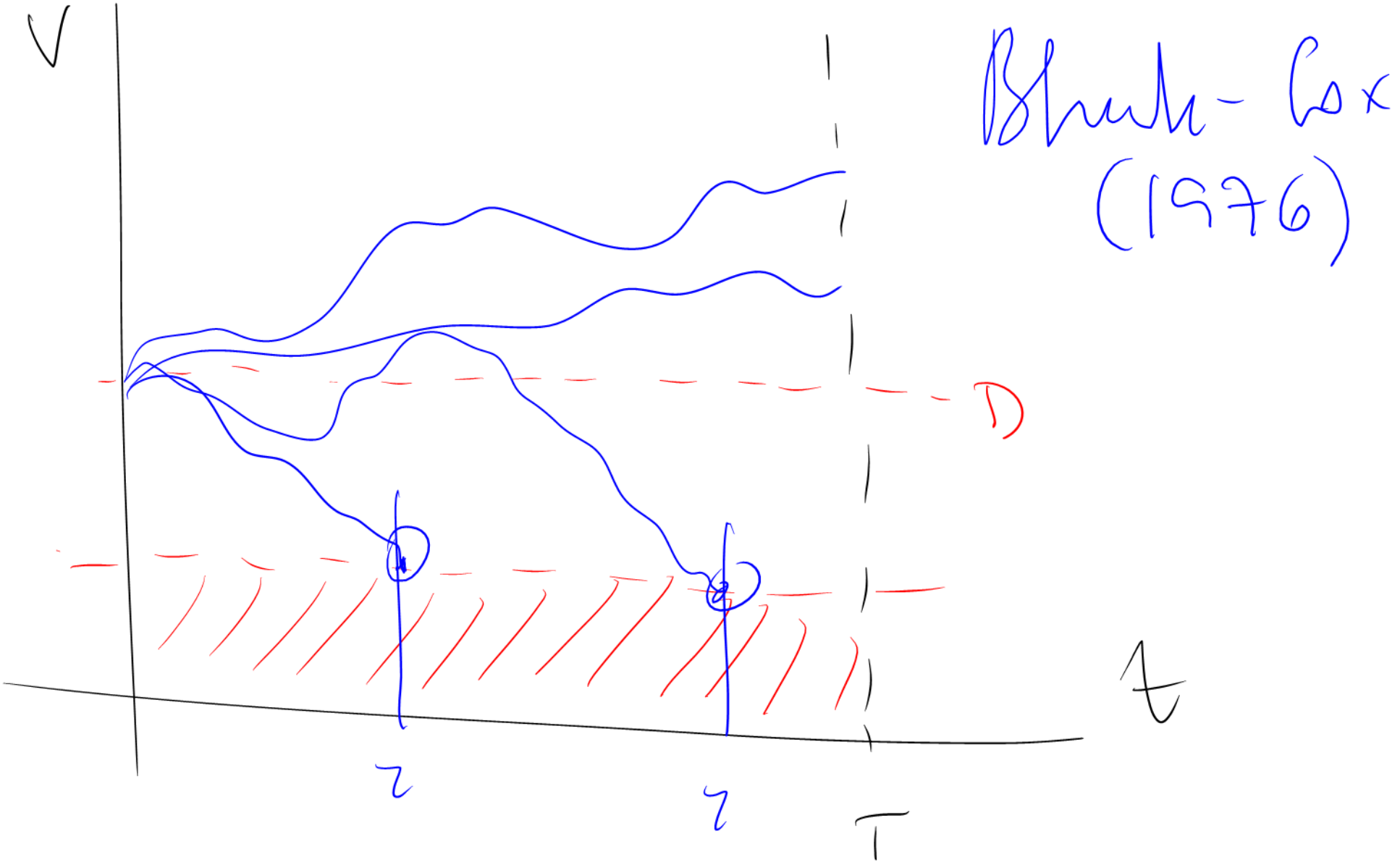



Now
default
collateral
defaults?
A
B
C
U
CVA, DVA

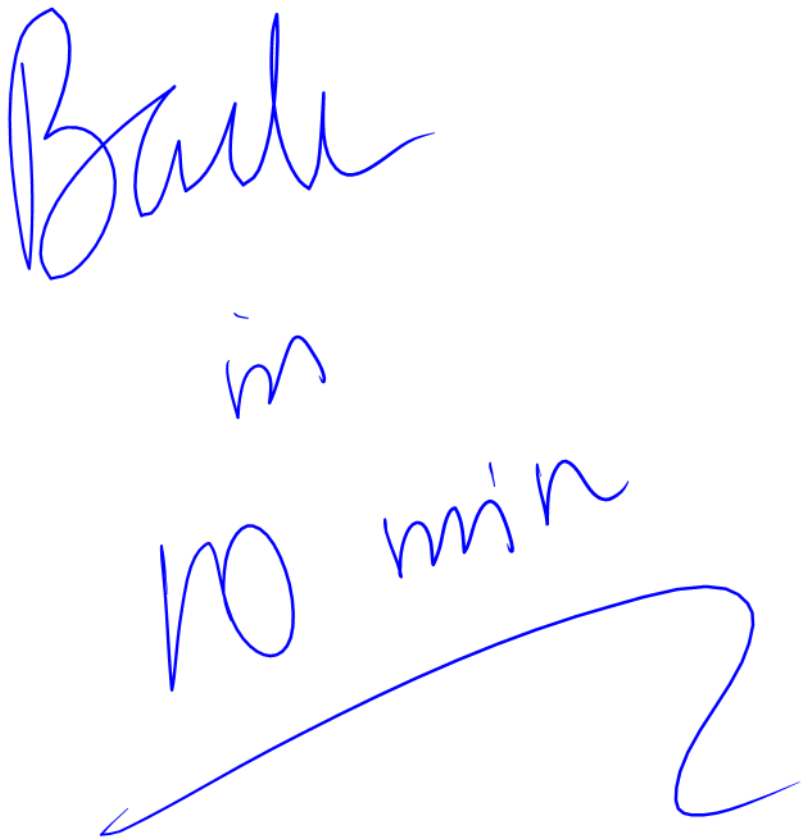

+
−
0
T
t
τ
(tau)
default
time
$
t = 0


y
z
x

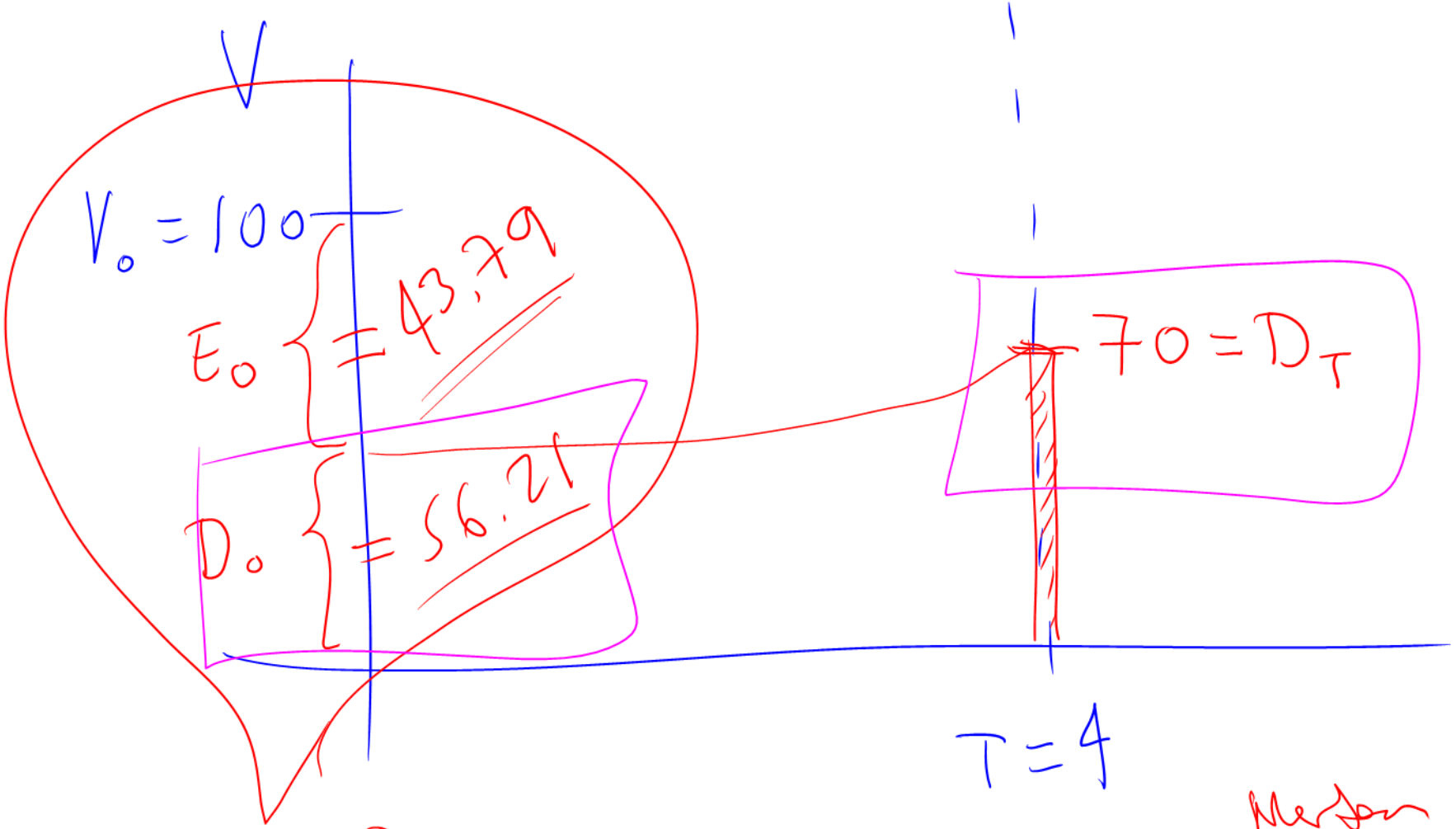

V(t) = E + D_T
E = V − D
if V_T > D_T then
E_T = V_T − D_T
if V_T < D_T then
E_T = 0
V
V_0
V_T
D_T
V_T
t
T
0
PD
E_T = max (V_T − D_T, 0)
call option



Black-Cox
(1976)


Back
in
10 min

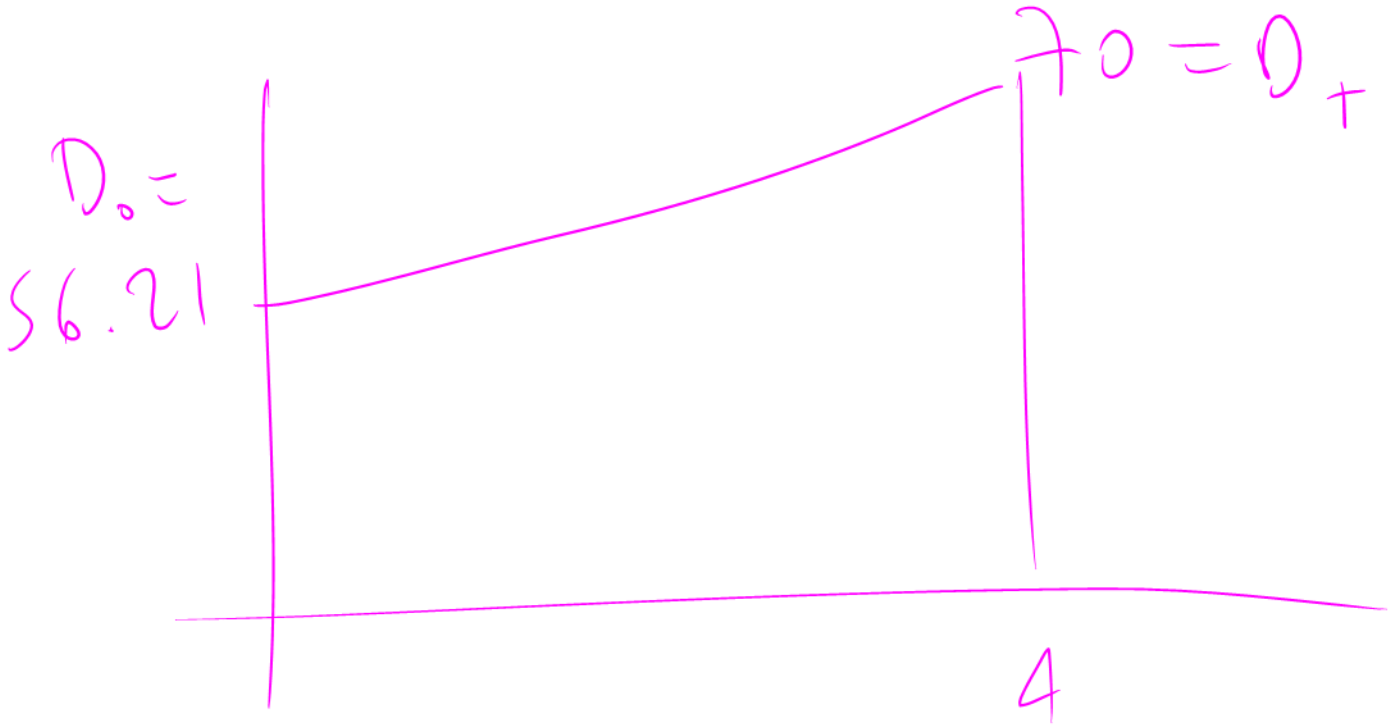
ABC



$V_0 = E_0 + D_0$

Merton

$\longrightarrow E_0 =$ (black-Scholes formula)



$$PV = DF \times FV$$

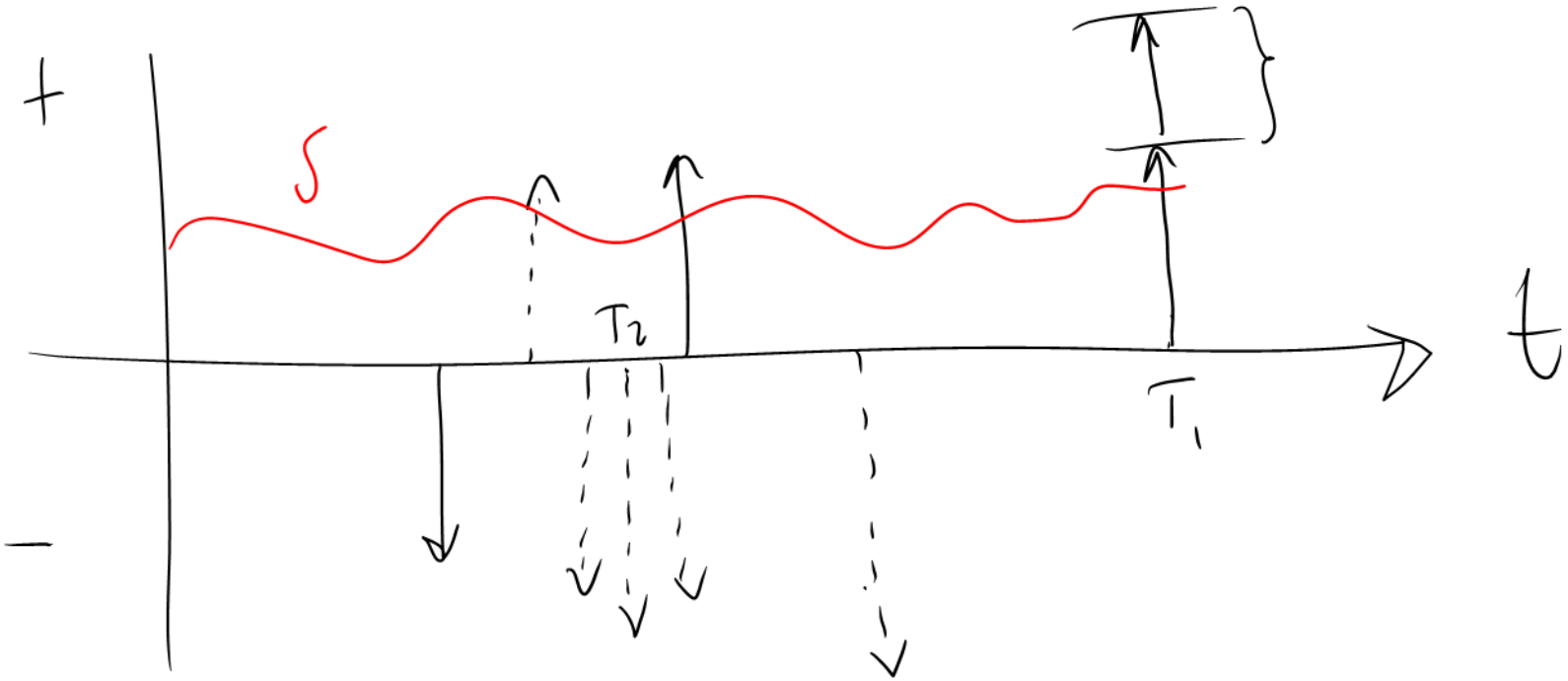
$$D_0 = \exp(-yT) \times D_T$$

$$\ln \frac{D_0}{D_T} = \cancel{\ln \exp}(-yT)$$

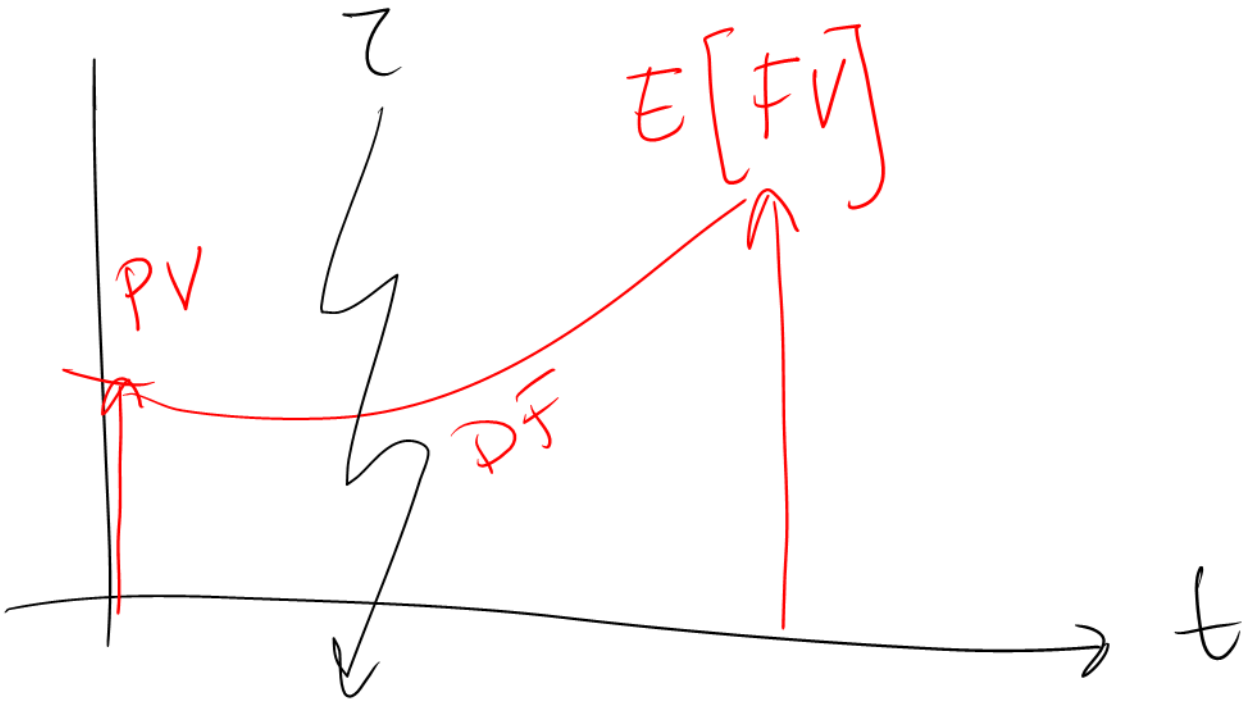
$$\rightarrow y = -\frac{1}{T} \ln\left(\frac{D_0}{D_T}\right)$$

$\sigma_V \neq \sigma_E$

→ Itô's lemma → two equations, two unknowns, solved.


+
S
T_2
t
T_1
−

ABC
Finance



$$PV = \cancel{DF \times FV}$$

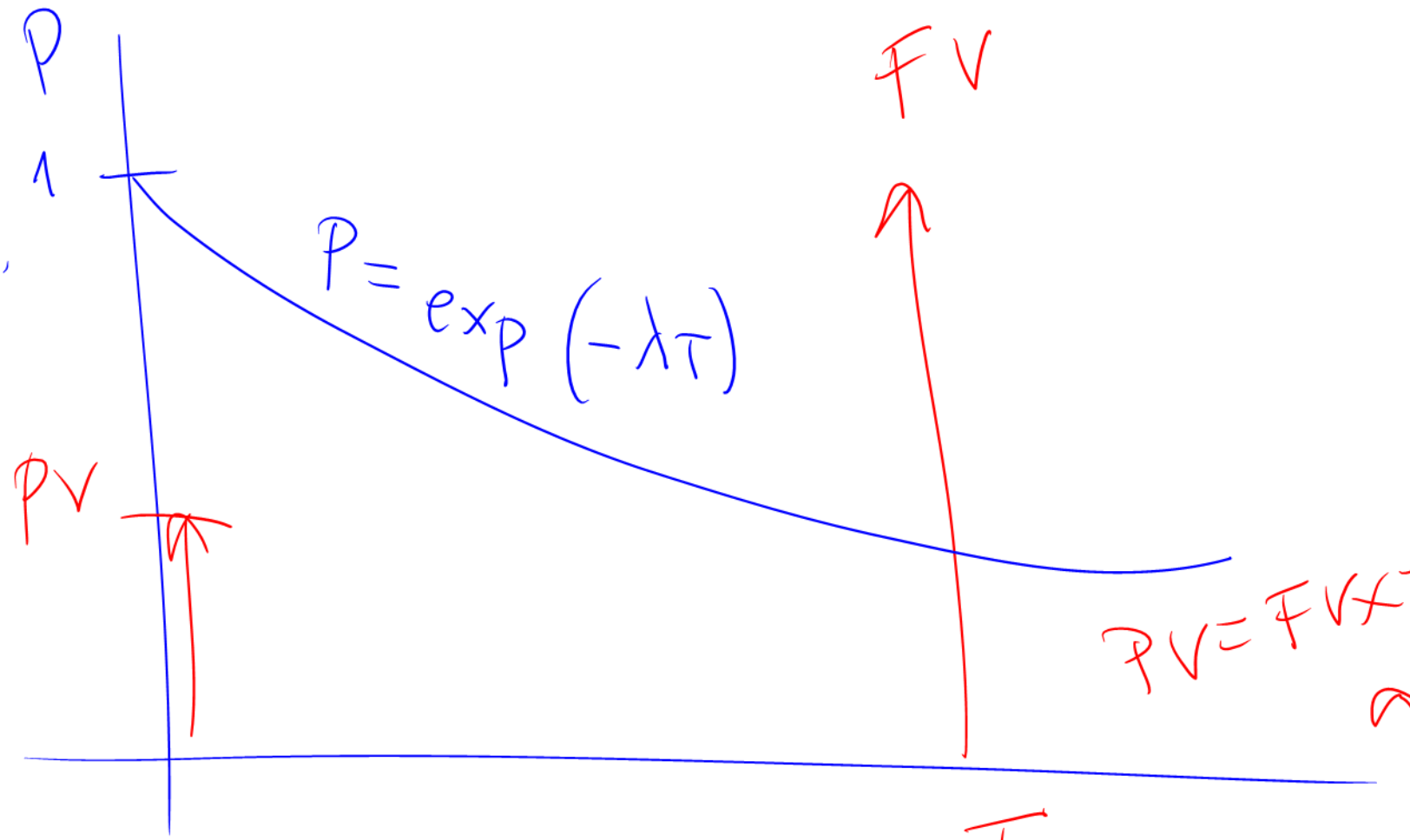
$$PV = DF \times E[FV]$$

$$PV = DF \times \bar{FV} \times P_T$$

simple probability

default probability

simple probability



$$PV = FV \times \exp\left(-(r+\lambda)T\right)$$

$$PV = DF \times E[FV]^{T}$$

$$PV = DF \times FV \times P$$

$$PV = \underline{\exp(-rT)} \times FV \times \underline{\exp(-\lambda T)}$$

$$CVA = (1-R) \int_{T_1}^{T_2} \left(e^{-\frac{s}{LGD} T_1} - e^{-\frac{s T_2}{LGD}} \right) E \, dt$$