



Assume:

$\$/\text{Euro}$ either

$\uparrow 5\%$ or $\downarrow 5\%$

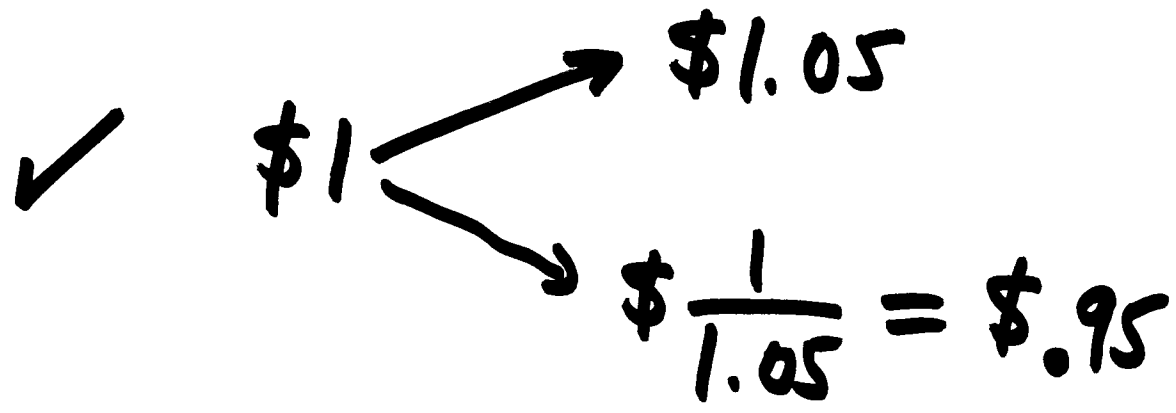
in each month

Bank loan rate
for 1 month is
1%

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Dan wants to
buy 100 Euros
for \$100
one month from now

Current: 1 Euro = \$1



③

Alice charges Dan

\$2.97,

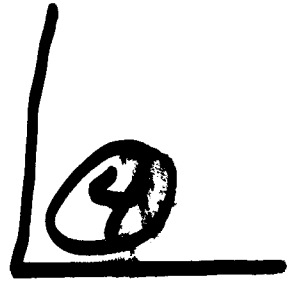
takes out a loan of

\$47.03,

buys 50 Euros for

\$50

Profit: \$0



One
month
later...

Scen. A1: 1 Euro = \$1.05

Alice's profit in \$ is

$$\text{Dan: } 100 - 105 = -5$$

$$\text{Bank: } -(7.03)(1.01) = -47.50$$

$$\text{Euros: } (50)(1.05) = 52.50$$

$$\text{Profit A1} = \$0$$



Scen A2: 1 Euro = \$.95

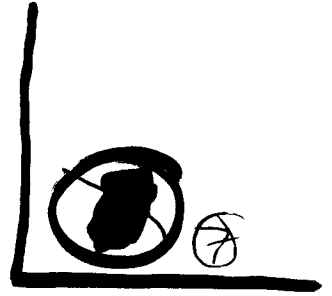
Alice's profit in \$ is

Dan: 0

Bank: $-(47.03)(1.01) = -47.50$

Euros: $(50)(.95) = 47.50$

Profit A2 = \$0



Alice charges Dan

$\$u$

takes out a loan of

$\$v$

buys $u+v$ Euros for

$\$(u+v)$

Profit = 80

Alice's Profits in \$:

$$A1: \underbrace{-5}_{\text{Don}} - \underbrace{5}_{\text{Bank}} (1.01) + \underbrace{(u+v)}_{\text{Euros}} (1.05)$$

$$A2: 0 - 5 (1.01) + (u+v) (.95)$$

$$\text{Profit } A1 = \text{Profit } A2 = 0$$

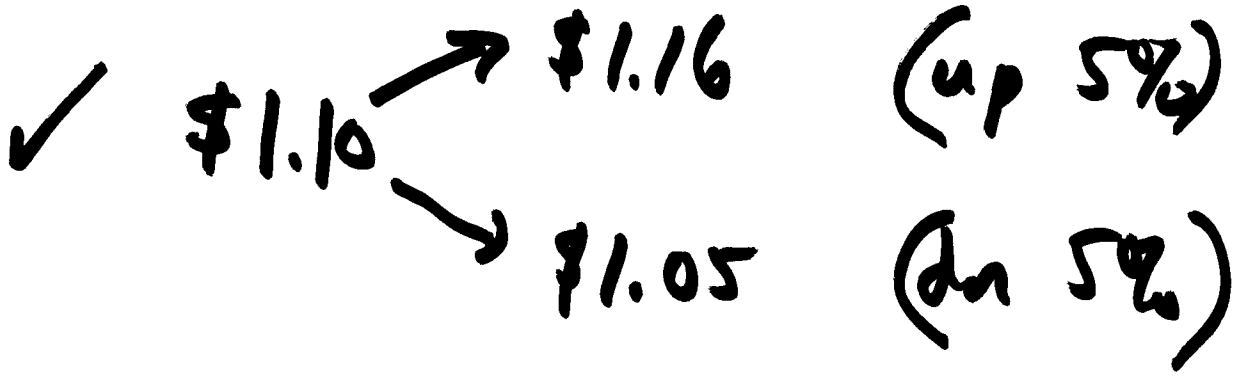
$$\Rightarrow u = 2.97, v = 47.03$$

✓ Alice charges \$2.97
& uses \$47.03 "hedge"



Earl wants to
buy 100 Euros
for \$100
one month from now

Current: 1 Euro = \$1.10



Beth charges Earl

$\$w$

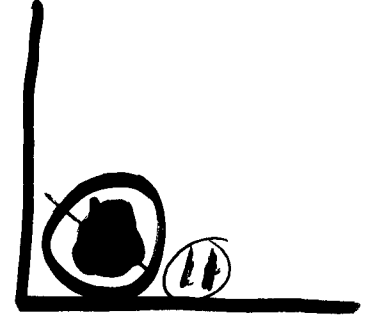
takes out a loan of

$\$x$

buys $(w+x)/1.1$ Euros for

$\$(w+x)$

Profit: $\$0$



One
month
later...

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Beth's profits in \$:

Earl Bank Euros

$$B1: -16 - x(1.01) + \frac{w+x}{1.1} 1.16$$

$$B2: -5 - x(1.01) + \frac{w+x}{1.1} 1.05$$

$$\text{Profit } B1 = \text{Profit } B2 = 0$$

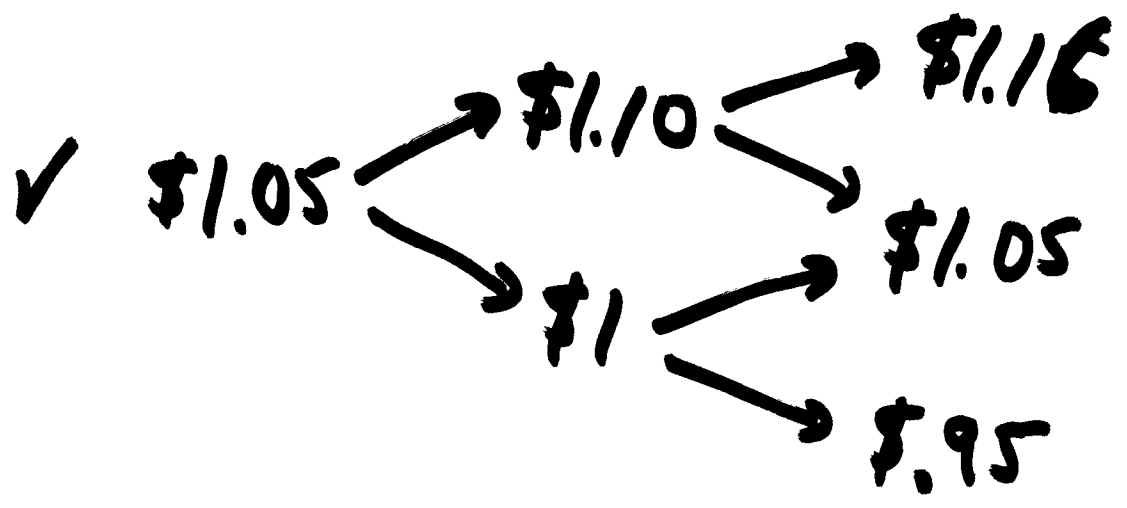
$$\Rightarrow w = 10.99, x = 99.01$$

Beth charges \$10.99

& uses \$99.01 "hedge"

Fred wants to
buy 100 Euros
for \$100
two months from now

Current: 1 Euro = \$1.05



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Cathy charges Fred

$\$y$,

takes out a loan of

$\$z$,

buys $(y+z)/1.05$ Euros for

$\$(y+z)$

Profit: $\$0$

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One
month
later...

Scen C1: 1 Euro = \$1.10

Cathy's profit in \$ is

Beth : - 10.99

Bank : - 2 (1.01)

Euros : $\frac{y+z}{1.05} \cdot 1.1$

Profit C1 = sum ↗

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$$\text{Profit } C1 = \text{Profit } C2 = 0$$

$$\Rightarrow y = 7.74, z = 76.47$$

Cathy charges \$7.74

& uses \$76.47 "hedge"

Seen C2: 1 Euro = \$1

Cathy's profit in \$ is

Alice: -2.97

Bank: -z(1.01)

Euros: $\frac{y+z}{1.05}$ (1)

Profit C2 = sum ↗