Assume:

$/€/Euro either

↑5% or ↓5%
in each month

Bank loan rate
for 1 month is
1%
Dan wants to buy 100 Euros for $100 one month from now.

Current: 1 Euro = $1

$1 \rightarrow 1.05$

$\frac{1}{1.05} = 0.95$

$\checkmark$
Alice charges Dan $2.97, takes out a loan of $47.03, buys 50 Euros for $50

Profit: $0
One month later...
Scenario: 1 Euro = $1.05

Alice's profit in $ is

Dan: 100 - 105 = -5
Bank: -(47.03)(1.01) = -47.50
Euros: (50)(1.05) = 52.50

Profit A1 = $0
Scen A2: 1 Euro = $0.95

Alice's profit in $ is

Dan: 0

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

Euros: \((50)(0.95) = 47.50\)

Profit A2 = $0
Alice charges Dan $u$

takes out a loan of $u$

buys $u+v$ Euros for $u(u+v)$

Profit = 80
Alice's Profits in $:

\[
\begin{align*}
&\text{Don}: \quad -5 - 5 \times (1.01) + (u+5) \times (1.05) \\
&\text{Bank}: \quad 0 - 5 \times (1.01) + (u+4) \times (0.95)
\end{align*}
\]

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

$1.10 \rightarrow $1.16 \quad (up \ 5\%)

$1.05 \rightarrow $1.00 \quad (down \ 5\%)
Beth charges Earl 
\$w 

takes out a loan of 
\$x 

bills \((w+x)/1.1\) Euros for 
\$(w+x) 

Profit: \$0
One month later...
Beth's profits in $:

<table>
<thead>
<tr>
<th></th>
<th>Earl</th>
<th>Bank</th>
<th>Euros</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1:</td>
<td>-16</td>
<td>-x(1.01) + \frac{w+x}{1.1} 1.16</td>
<td></td>
</tr>
<tr>
<td>B2:</td>
<td>-5</td>
<td>-x(1.01) + \frac{w+x}{1.1} 1.05</td>
<td></td>
</tr>
</tbody>
</table>

Profit B1 = Profit B2 = 0

⇒ 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
Cathy charges Fred $y\$, 
takes out a loan of 
$z$, 
buys \((y+z)/1.05\) Euros for 
\(\delta (y+z)\) 

Profit: \$0
One
month
later...
Scene C1: 1 Euro = $1.10

Cathy's profit in $ is

Beth: -$10.99

Bank: -2 (1.01)

Euros: \( \frac{y+2}{1.05} \) 1.1

Profit C1 = sum \( \uparrow \)
\[ \text{Profit } C_1 = \text{Profit } C_2 = 0 \]

\[ \Rightarrow y = 7.74 \quad z = 76.47 \]

Cathy changes $7.74

& uses $76.47 "hedge"
Seen C2: 1 Euro = $1
Cathy's profit in $ is
Alice: $-2.97$
Bank: $-2(1.01)$

Euros: \[ \frac{y+3}{1.05} \quad (1) \]

Profit C2 = sum