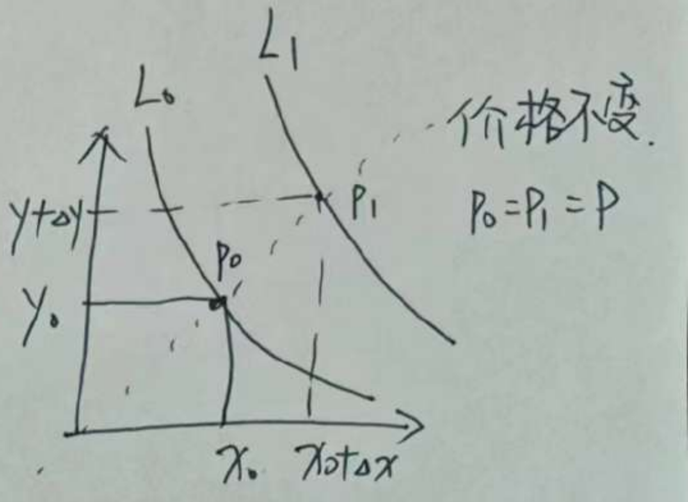
$x\cdot y=k=L^2 \Rightarrow \sqrt{xy}=L$

价格 $p=\frac{y}{x}$ x用y计价



$L_0=\sqrt{x_0\cdot y_0}$

添加流动性. Δx 和 Δy

$L_1=\sqrt{(x_0+\Delta x)(y+\Delta y)}$

求 $\Delta L=L_1-L_0=\Delta x\cdot\sqrt{P}=\frac{\Delta y}{\sqrt{P}}$

解: 将 $x=\frac{y}{p}\Rightarrow x\cdot y=\frac{y^2}{p}\Rightarrow L^2=\frac{y^2}{p}\Rightarrow L=\frac{y}{\sqrt{p}}$

$y=xP\Rightarrow L=\frac{xP}{\sqrt{P}}=x\sqrt{P}$

用x表示:

$\Delta L=L_1-L_0=(x_0+\Delta x)\sqrt{P_1}-x_0\sqrt{P_0}$

因为 $P_0=P_1$

$\Delta L=(x_0+\Delta x)\sqrt{P_0}-x_0\sqrt{P_0}=\Delta x\sqrt{P_0}$

用y表示:

$\Delta L=L_1-L_0=\frac{y_0+\Delta y}{\sqrt{P_1}}-\frac{y_0}{\sqrt{P_0}}$

因为 $P_0=P_1$

$\Delta L=\frac{y_0+\Delta y}{\sqrt{P_0}}-\frac{y_0}{\sqrt{P_0}}=\frac{\Delta y}{\sqrt{P_0}}$

案例:

初始LP: 100 DAI : 1 ETH.

$$x \cdot y = k \Rightarrow 100 \cdot 1 = 100.$$

$$P_E = 100\ \text{DAI}/\text{ETH}$$

总价值 = 100 DAI + 1 ETH = 200 U

ETH涨价: 120 DAI : 0.83 ETH

$$x \cdot y = k \Rightarrow 120 \cdot 0.83 = 100$$

$$P_E = \frac{120}{0.83} = 144.58\ \text{DAI}/\text{ETH}$$

总价值 = 120 DAI + 0.83 ETH = 240 U

如果不做LP:

总价值 = 100 DAI + 1 ETH = 100 + 144.58
= 244.58

少赚 244.58 − 240 = 4.58 U

ETH降价: 80 DAI : 1.25 ETH

$$x \cdot y = k \Rightarrow 80 \cdot 1.25 = 100$$

$$P_E = \frac{80}{1.25} = 64\ \text{DAI}/\text{ETH}.$$

总价值 = 80 DAI + 1.25 ETH = 160 U

如果不做LP:

总价值 = 100 DAI + 1 ETH = 164 U.

少亏 164 − 160 = 4 U

token x (ETH). token y (DAI)

③

x: 池子里ETH的数量

y: 池子里DAI的数量

$P = \frac{y}{x}$: ETH用DAI计价的价格. 例: $P = \frac{1000\,DAI}{10\,ETH} = 100\,DAI/ETH$

由 $\sqrt{xy} = L$ 和 $P = \frac{y}{x}$. 可以得出 $\begin{cases} y = \frac{L^2}{x} \Rightarrow y = L\sqrt{P} \\ x = \frac{y}{P} \Rightarrow x = \frac{L}{\sqrt{P}} \end{cases}$

$$IL(d) = \frac{\text{做LP的损失}}{hodl} = \frac{V_1 - V_{hodl}}{V_{hodl}}$$

V_1: 在t_1时刻. 池子里token的价值

V_{hodl}: 在t_1时刻. 如果不做LP. token的价值

P_0: 在t_0时的价格. $P_0 = \frac{x_0}{y_0}$

P_1: 在t_1时的价格. $P_1 = \frac{x_1}{y_1}$

$$V_1 = y_1 + x_1 \cdot P_1 = L\sqrt{P_1} + \frac{L}{\sqrt{P_1}} \cdot P_1 = 2L\sqrt{P_1}$$

$$V_{hodl} = y_0 + x_0 P_1 = L\sqrt{P_0} + \frac{L}{\sqrt{P_0}} \cdot P_1$$

规定 $P_1 = P_0 \cdot d$

$$V_{hodl} = L\sqrt{P_0} + \frac{L}{\sqrt{P_0}} \cdot P_0 d = (1+d)L\sqrt{P_0}$$

$$IL(d) = \frac{V_1 - V_{hodl}}{V_{hodl}} = \frac{2L\sqrt{P_0 d} - (1+d)L\sqrt{P_0}}{(1+d)L\sqrt{P_0}} = \frac{2\sqrt{d} - (1+d)}{1+d}$$

$$= \frac{2\sqrt{d}}{1+d} - 1$$