

Desire delta $f(p)$ at stock price p . Suppose f decreasing and 0 at the initial price \bar{p} .

Take a sold put option on this stock with strike x . Let $g(p, x)$ denote the delta of this option. Likewise for a sold call option using $h(p, x)$ and suppose their deltas as at expiry.

At each strike $x < \bar{p}$ sell $-f'(x)\Delta$ put options (where Δ is the distance between strikes), and at each strike $x > \bar{p}$ sell $-f'(x)\Delta$ call options.

At price $p < \bar{p}$ delta of portfolio is

$$\sum_{\{i:p \leq x_i \leq \bar{p}\}} -f'(x_i)\Delta g(p, x_i) = \sum_{\{i:p \leq x_i \leq \bar{p}\}} -f'(x_i)\Delta,$$

which converges as Δ goes to 0 to $\int_p^{\bar{p}} -f'(t)dt = f(p)$.

For price $p > \bar{p}$

$$\sum_{\{i:\bar{p} \leq x_i \leq p\}} -f'(x_i)\Delta h(p, x_i) = \sum_{\{i:\bar{p} \leq x_i \leq p\}} f'(x_i)\Delta,$$

converges as Δ goes to 0 to $\int_{\bar{p}}^p f'(t)dt = f(p)$.

- For continuous strikes portfolio consists of infinitesimal quantity of each option