



# Biotech Innovation Fund

## Holdings Revisit

The final updates were on 3/15/2024, selected by the MVO model.

Code	Stock	Weight(%)
BSX	Boston Scientific Corp.	47.1%
VRTX	Vertex Pharmaceuticals Inc.	20.0%
KRTX	Karuna Therapeutics Inc.	11.7%
REGN	Regeneron Pharmaceuticals Inc.	7.6%
NBIX	Neurocrine Biosciences Inc.	13.6%

	NBIX	KRTX	REGN	VRTX	BSX	Weight-Return
Annual Return	79%	54%	8%	-30%	27%	24.42%

## Risk Defined

Based on the Beta values of our portfolio holdings, it's evident that NBIX, REGN, and VRTX have Betas smaller than 1. This suggests that these stocks may not exhibit as significant fluctuations as the broader market. Conversely, KRTX and BSX are more closely aligned with market movements, with BSX representing a substantial portion of our portfolio.

Furthermore, all stocks in our portfolio have positive Beta values, indicating they may not have the ability to defend against downside change. As a result, it's imperative to tailor our hedging strategy accordingly.

Holding	NBIX	KRTX	REGN	VRTX	BSX	Total
Weight	13.6%	11.7%	7.6%	20.0%	47.1%	100.00%
Beta	0.67	1.1	0.58	0.73	0.92	
Drop 10%	7%	11%	6%	7%	9%	8.43%

## Hedging Strategy

Based on the characteristics of our portfolio, comprised of just five publicly traded stocks, liquidity concerns are not an issue. Therefore, our chosen hedging strategy is the 'Covered Put.' With stock holdings in place, we can mitigate downside risk by purchasing put options. This strategy allows us to lock in a sale price for our stocks by paying a premium for the option.

Given the portfolio's Beta, the portfolio stocks may not fully reflect market changes. In such cases, put options serve not only as a safeguard but also as a controllable cost. Moreover, in the event of a continuous recession, we can enhance our hedging strategy by adding a 'Reversals Risk' component through shorting call options. Conversely, in anticipation of a market rebound, we can adopt a 'Strangle' strategy by longing for a call option with a different strike price.

## Cover Put

We will employ Beta to estimate our risk exposure in the event of a 10% market downturn and provide details of the options comprising our Cover Put strategy. Currently, our portfolio holds \$1M in assets, and our objective is to create a Cover Put strategy to fully hedge our risk exposure.

Assuming five potential market scenarios following the purchase of put options (-10%, -5%, 0%, 5%, and 10%), the table below outlines the required number of options for building our strategy. To achieve

complete hedge coverage, we calculate the risk exposure by multiplying the number of stock shares by the Delta ratio. Given that each option represents 100 shares of stock, we can then estimate the cost and quantity of puts necessary to fully hedge against downside risk.

Holding	NBIX	KRTX	REGN	VRTX	BSX	Total
Invest	135,706	117,326	76,145	199,523	471,299	1,000,000
Stock-price	139.1	329.83	964.47	407.69	66.23	
Share	976	356	79	489	7116	
Option-Ask	5.3	0.4	11.8	5.9	2.15	
Option cost/per	530	40	1180	590	215	
Delta (ITM)	-0.64	-0.67	-0.54	-0.65	-0.98	
Exposure	-624	-238	-43	-318	-6974	
Option need	6	2	0.4	3	70	
Option total cost	3,309	95	503	1,877	14,994	20,778

As illustrated in the table below, when the market experiences a downturn of approximately 10%, utilizing the Cover put enables us to sell stock at the strike price. This hedging strategy allows our portfolio to achieve a 13.7% return in such a scenario. Based on the aforementioned conclusion, we can compute returns across five distinct scenarios, ensuring complete hedging against recession. Even in the event of a 10% market upswing, we can still maintain a positive return.

Holding	NBIX	KRTX	REGN	VRTX	BSX	Total return
Option strike price	140	410	965	410	67.5	
chg (-10%)	-6.70%	-11.00%	-5.80%	-7.30%	-9.20%	
Stock price after (-10%)	129.78	293.55	908.53	377.93	60.14	
Option return after (-10%)	7.9%	39.7%	6.2%	8.5%	12.2%	
Return-Weight after (-10%)	1.1%	4.7%	0.5%	1.7%	5.8%	13.7%

Portfolio return	Portfolio	Option cost	Profit	Gain/Loss
-10%	1,112,984	20,778	1,092,206	92,206
-5%	1,063,303	20,778	1,042,525	42,525
0%	1,018,005	20,778	997,227	-2,773
5%	1,020,515	20,778	999,737	-263
10%	1,061,809	20,778	1,041,031	41,031

## Risk can't be hedged

As evidenced by this report, derivative tools can effectively mitigate systemic risk, while liquidity risk can be managed through strategic trading of public stocks. Nevertheless, challenges persist in hedging option liquidity and maturity risks.

Option liquidity risk arises from the limited trading volume of options, posing potential difficulties in finding counterparties due to the derivative market's zero-sum nature. Similarly, maturity risk presents a challenge, as relying solely on the Delta ratio may not provide a comprehensive assessment of option value transformation. Discrepancies between actual and theoretical prices could undermine our hedging strategies, leading to potential failures.

## Reference

Option information: <https://finance.yahoo.com/>

Contract Name	Last Trade Date (EDT)	Strike	Last Price	Bid	Ask	Change	% Change	Volume	Open Interest	Implied Volatility
NBIX240419P00140000	3/15/2024 4:39 PM	140	4.95	4.60	5.30	+0.39	+8.55%	3	25	28.48%
VRTX240322P00410000	3/15/2024 5:05 PM	410	5.90	5.30	5.90	+1.80	+43.90%	6	50	22.25%
KRTX240419P00330000	3/15/2024 6:32 PM	330	0.40	0.05	0.40	+0.15	+60.00%	22	114	0.77%
BSX240419P00067500	3/15/2024 6:17 PM	67.5	2.30	2.05	2.15	+0.35	+17.95%	32	977	17.53%
REGN240322P00965000	3/15/2024 7:14 PM	965	11.75	10.70	11.80	+1.55	+15.20%	1	7	23.37%

Option Delta: <https://marketchameleon.com/>