MDB CAPITAL

Comprehensive Backtesting Analysis of Investment Strategies:

Performance Assessment Across Companies MDB Capital Has Taken Public

May 2025

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Abstract

This document presents a systematic backtesting framework developed to evaluate hypothetical sell strategies across 17 companies MDB Capital has taken public. The goal is to illustrate the impact of various investor strategies on returns, based on gain thresholds and predefined exit timelines. The methodology assumes access to all 17 companies MDB Capital has taken public enabling a standardized comparison of strategy outcomes. Through rigorous scenario analysis, the study contributes valuable insights into the optimization of investment portfolios, offering actionable scenarios for tailoring investment strategies according to specific risk preferences. The findings underscore the importance of aligning investment approaches with investor profiles, highlighting the trade-offs between maximizing short-term returns and achieving long-term capital appreciation.

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1. Introduction

This document presents a systematic backtesting framework designed to evaluate hypothetical sell strategies across 17 companies MDB Capital has taken public or "Big Idea Companies". The primary objective is to illustrate the impact of various investor strategies on investment returns, based on predefined gain thresholds and exit timelines tailored to different risk preferences. This analysis contributes valuable insights into the optimization of investment portfolios, offering actionable scenarios for aligning investment approaches with specific investor profiles and highlighting the inherent trade-offs between maximizing short-term gains and achieving long-term capital appreciation.

The traditional venture capital model often entails long-duration capital commitments, illiquidity, and a reliance on event-driven returns realized over an extended 7–10 year cycle[1]. This structure, while suitable for company building, can limit flexibility for investors who may desire interim liquidity or more active portfolio management capabilities. In response to these structural limitations, MDB Capital has developed a backtesting framework intended to introduce a more dynamic, data-informed approach to exit planning and capital recycling within venture portfolios.

MDB Capital, established in 1997, focuses on transforming deep technology "Big Ideas" into valuable public companies through a unique public venture capital model. [2] This model facilitates community-driven financing for pre-revenue, early-stage technology companies via early public offerings, primarily on NASDAQ. [3] The firm has a history of successfully taking companies public. In fact, it has never failed to take a company public. [4] The backtesting analysis utilizes the historical performance of the 17 "Big Idea Investments" MDB Capital has taken public, spanning from the initial private placement in 1996 to the latest IPO in 2024. [5]

2. Methodology Overview

The backtesting tool simulates various exit strategies for investors across MDB Capital's historical "Big Idea Investments". The analysis assumes an equal capital allocation to both Private Placement (PP) and Initial Public Offering (IPO) rounds for each applicable company.

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[1] https://www.deutschewealth.com/en/insights/investing-insights/asset-class-insights/venture-capital-investing-closer-look/portfolios-venture-capital.html
[2] MDB Capital Holdings Year-End Update, accessed April 30, 2025, https://www.mdb.com/press-releases/mdb-capital-holdings-year-end-update/
[3] MDB Capital - We Launch Big Ideas, accessed April 30, 2025, https://www.mdb.com/
[4] MDB Capital Announces Record Date and Expected Timing for Initial Public Offering for Invizyne Technologies, accessed April 30, 2025, https://investors.mdb.com/press-release
[5] MDB Outcomes, accessed April 30, 2025, https://www.mdb.com/why-mdb/outcomes/

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Time is a critical factor in the model, with the Internal Rate of Return (IRR) calculated using the specific dates of the PP investment, the IPO, and all subsequent share sales within the defined tranches. Any shares remaining unsold at the conclusion of the final investment period are assumed to be liquidated at the latest available price. All performance metrics are calculated using the original Private Placement and IPO purchase prices, adjusted to account for any stock splits or reverse stock splits. This methodology aims to provide a standardized comparison of strategy outcomes across a consistent set of historical investments.

The backtesting framework incorporates several elements of scientific rigor and aligns with industry best practices. By utilizing historical price data for all available investments, the model reduces the potential for survivorship bias, which can occur when only data from companies that have survived to the present day are included, thus artificially inflating returns.[6] Furthermore, the simulation of multiple investment strategies with varying gain thresholds allows for an assessment of the robustness and sensitivity of each approach under different market conditions.[6] The model's tranche-based structure also facilitates an explicit analysis of downside risk and potential drawdowns, consistent with advanced backtesting methodologies. Backtesting is a crucial process in finance that involves testing a trading strategy's effectiveness by applying it to historical data to understand its potential future performance.[7] While past performance is not a guarantee of future results, backtesting helps validate financial strategies before they are implemented in live markets and supports risk management by allowing investors to assess the viability and safety of their strategies without risking actual capital.

The selection of companies for the model includes all companies MDB Capital has taken public ("Big Idea Investments") spanning from 1996 to 2024.[8] One key assumption of the model is the equal allocation of capital to private placement and IPO rounds, which might not always reflect the diverse allocation strategies employed by individual investors in real-world scenarios. Additionally, the rule of final liquidation at the latest available price assumes a certain level of marketability for all remaining shares, which could potentially overestimate realized gains, particularly for less liquid venture capital investments. The

[6] Backtesting - Definition, Example, How it Works - Corporate Finance Institute, accessed April 30, 2025, https://corporatefinanceinstitute.com/resources/data-science/backtesting/
[7] What is backtesting and its role in financial strategy validation - StoneX, accessed April 30, 2025, https://www.stonex.com/en/financial-glossary/backtesting/
[8] MDB Capital Holdings Year-End Update, accessed April 30, 2025, https://www.mdb.com/press-releases/mdb-capital-holdings-year-end-update/

focus on MDB Capital's "Big Idea Investments," which are typically high-growth and potentially high-risk ventures, suggests that the backtesting results might be most relevant to portfolios with a similar investment focus.[9]

Table 1. *List of companies MDB Capital has taken public with corresponding PP and IPO dates and prices*

Ticker	Name	PP date	PP price	IPO/merger Date	IPO Price
HEPH	Hollis-Eden	**19-Mar-96**	$2.25	**26-Mar-97**	$10.19
MTEX	Mannantech, Inc.			**13-Feb-99**	$80.00
LIPD	Lipid-Sciences		$2.25	**9-Jul-01**	$4.49
MDVN	Medivation			**20-Dec-04**	$0.39
VHC	Virnetx Holding Corporation	**5-Jul-07**	$15.00	**5-Jul-07**	$80.00
UNXL	Uni-Pixel			**10-Dec-10**	$5.00
TBCH	Turtle Beach (Parametric Sound)			**22-Mar-12**	$4.50
CLIR	ClearSign Technologies, Inc.	**20-Apr-11**	$2.20	**25-Apr-12**	$4.00
IPWR	Ideal Power Inc.	**1-Dec-12**	$34.80	**21-Nov-13**	$50.00
WATT	Energous Corporation	**17-May-13**	$60.00	**28-Mar-14**	$120.00
RESN	Resonant	**1-Jun-13**	$3.00	**29-May-14**	$6.00
EYES	Second Sight (Vivani Medical)			**19-Nov-14**	$216.00
PLSE	Pulse Biosciences, Inc.	**6-Nov-14**	2.67	**18-May-16**	$4.00
AREN	The Arena Group Holdings, Inc.	**4-Apr-17**	$15.40	**19-Jul-17**	$15.40
CUE	Cue Biopharma, Inc.	**1-Dec-16**	$5.00	**2-Jan-18**	$7.50
PRVB	Provention Bio, Inc.	**1-Feb-17**	$2.50	**19-Jul-18**	$4.00
EXOZ	Exozymes Inc.			**12-Nov-24**	$8.00

3. Strategy Framework

The backtesting analysis evaluates three distinct investment strategies, each designed to reflect different investor risk profiles and characterized by specific gain thresholds and selling behaviors. These profiles are the **"Buy and Hold"** strategy, the "**Balanced Strategy**," and the "**Active Management Strategy**." Each strategy operates within a framework that divides the investment horizon into three tranches: a Short-term tranche (**T1**) spanning 1–2 years, a Medium-term tranche (**T2**) covering 2–5 years, and a Long-term tranche (**T3**) extending from 5–10 years. This tranche-based approach to investment is a method used to

[9] Venture Capital Primer - Meketa Investment Group, accessed April 30, 2025, https://meketa.com/wp-content/uploads/2023/09/MEKETA_Venture-Capital-Primer.pdf

manage risk and align the interests of investors and founders by releasing funds in stages based on the achievement of specific milestones.[10]

The **"Buy and Hold Strategy"** prioritizes long-term capital appreciation and has a unique exit logic. For this strategy, the time horizon is not a primary consideration until year 10. Instead, it focuses on selling the initial portion of the portfolio only if a high gain threshold is reached before the tenth year. Otherwise, the investor holds 100% of their portfolio until the 10-year mark, at which point the entirety of its portfolio is sold.

The **"Balanced Strategy"** employs medium-term gain thresholds and sell percentages, aiming to capture both near-term surges in value and mid-to-long-term appreciation. This approach seeks to strike a balance between risk and reward by taking profits at moderate gain levels while still maintaining exposure to longer-term growth opportunities.

The **"Active Management Strategy"** is characterized by lower gain thresholds and a more gradual selling approach across the three tranches. This strategy aligns with a more risk-averse investor seeking stable, long-term returns and downside protection through earlier and more frequent monetization of gains. A key feature of this strategy, as indicated later in the report, involves selling a larger percentage of the portfolio in the earlier tranches.

Selling decisions for all strategies are contingent upon meeting or exceeding predefined gain thresholds within the specified tranches, reflecting different investor risk tolerances.[11] For the first two tranches (T1 and T2), if the gain condition is satisfied, the investor sells a defined allocation at the price closest to the threshold (in the upward direction) within the tranche's time range. In the case of the last tranche (T3), shares are sold at the price at year 10, if applicable, or at the latest available trading price. If the gain condition is not met in a given tranche, the investor defers selling. However, in subsequent tranches, if the cumulative return exceeds the new threshold, the investor sells both the current tranche allocation and any unsold shares from previous periods. At the end of the 10-year cycle, all remaining holdings are liquidated at the latest price available in the dataset.

[10] Economic terms - tranched investments, preference dividends, and growth shares | Ashfords, accessed April 30, 2025, https://www.ashfords.co.uk/insights/blog/economic-terms-tranched-investments-preference-dividends-and-growth-shares

[11] A Guide to Risk Profiles | Charles Schwab, accessed April 30, 2025, https://www.schwab.com/learn/story/guide-to-risk-profiles

Table 2. *Sell Strategy Matrix*

Strategy	Sell	Gain Threshold	Sell % of portfolio	Gain Threshold	Sell % of portfolio
		Private Placement		Initial Public Offering	
Buy and Hold	If threshold is reached	250%	30%	150%	30%
	in year 10	0%	70%	0%	70%
Balanced Approach	Within 1-2 years	300%	40%	100%	40%
	Within 3-5 years	500%	40%	250%	40%
	in year 10	0%	20%	0%	20%
Active Management	Within 1-2 years	250%	50%	100%	50%
	Within 3-5 years	400%	25%	200%	25%
	in year 10	0%	25%	0%	25%

The backtesting tool calculates the number of shares to be sold and executes the sale as soon as the price reaches or surpasses the expected return for that tranche. The date of the sale and the price are recorded and subsequently used to calculate the Internal Rate of Return (IRR) for that investment.

Table 3. *Example of price stamp and share sale on T1 for Provention Bio, Inc.*

	Private Placement				Initial Public Offering				Total	
Ticker	Shares sold T1	Date Sold	Revenue	After tax Rev	Shares sold T1	Date Sold	Revenue	After Tax Rev	Revenue T1	Total After tax
PRVB	160	11/27/2019	$1,600.00	$1,219.20	100	11/7/2019	$800.00	$609.60	**$2,400.00**	**$1,828.80**

The IRR for each investment was calculated using the XIRR function in Microsoft Excel. This formula accommodates specific dates and asymmetrical cash flows, providing a more accurate measure of investment performance for staged exits compared to simpler return calculations.[12] The IRR was calculated at both the individual company level and the overall portfolio level, allowing for a comprehensive assessment of each strategy's effectiveness. While the exit logic based on gain thresholds provides a systematic framework for

[12] Internal Rate of Return (IRR) | Formula + Calculator - Wall Street Prep, accessed April 30, 2025, https://www.wallstreetprep.com/knowledge/irr-internal-rate-of-return/

backtesting, it is important to note that real-world exit decisions in venture capital are often more complex and influenced by a wider array of factors beyond just price multiples.[13]

Table 4. *Example of IRR Calculations*

Company	Dates	Cash Flow	Cash Flow After Tax	Description
Company A	19-Mar-96	($1,000)	($1,000)	PP Investment
Company A	26-Mar-97	($1,000)	($1,000)	IPO Investment
Company A	5/12/1997	$1,600.00	$1,219.20	PP Tranche 1
Company A	3/17/1999	$800.88	$610.27	IPO Tranche 1
Company A	8/19/1999	$2,401.80	$1,830.17	PP Tranche 2
Company A	24-Mar-07	$251.44	$221.52	PP Tranche 3
Company A	24-Mar-07	$166.56	$146.74	IPO Tranche 3
IRR		**59.61%**	**36.87%**	

4. Data Input and Tool Features

The backtesting tool is designed to accept several key inputs to allow for the simulation of different investment scenarios. These inputs include the selection of one of the three defined Investment Strategies ("Buy and Hold", "Balanced Approach", and "Active Management"), the specification of the Total Initial Investment Amount intended for allocation across both PP and IPO rounds, the State in which the investor will be taxed (which directly affects the after-tax IRR due to variations in state capital gains tax rates [14]), and the specific Gain Thresholds and Percentage of Portfolio to Sell associated with the chosen investment strategy.

BACKTESTING TOOL

Parameter Selection	
Investment Strategy	**Balanced Approach**
Investment amount per Co.	**$1,000**

Total invested in PP	**$11,000**
Total Invested in IPO	**$17,000**

[13] Backtesting - Definition, Example, How it Works - Corporate Finance Institute, accessed April 30, 2025, https://corporatefinanceinstitute.com/resources/data-science/backtesting/

[14] Inside the Qualified Small Business Stock (QSBS) Exclusion | Morgan Stanley, https://www.morganstanley.com/content/dam/msdotcom/atwork/qualified-small-business-stock/QSBS-Exclusion.pdf

Total invested	**$28,000**
Shares purchased in PP	**2,828**
Shares purchased in IPO	**4,622**
Tax State	**Texas**

For each simulated scenario, the tool dynamically determines the number of shares to be purchased in each of the 17 portfolio companies. This calculation is based on the Total Initial Investment Amount and the historical prices of the PP and IPO rounds for each company. The tool then distributes the allocated capital between the PP and IPO categories accordingly. Once the initial portfolio is established, the tool applies the defined selling strategy, based on the specified gain thresholds and tranche-based exit logic, to simulate the resulting cash flows over the investment horizon. Finally, the tool computes the final realized gains and the Internal Rate of Return (IRR) for the entire portfolio under the given strategy and input parameters.

Table 5. *Distribution of bought shares*

Ticker	Company	PP Date	IPO Date	Shares purchased in PP	Shares purchased in IPO	Total Shares
HEPH	**Hollis-Eden**	19-Mar-96	26-Mar-97	444	98	543
MTEX	**Mannantech, Inc.**		13-Feb-99	0	13	13
LIPD	**Lipid-Sciences**	9-Jul-01	9-Jul-01	444	223	667
MDVN	**Medivation**		20-Dec-04	0	2,581	2,581
VHC	**Virnetx Holding Corporation**	5-Jul-07	5-Jul-07	67	13	79
UNXL	**Uni-Pixel**		10-Dec-10	0	200	200
TBCH	**Turtle Beach (Parametric Sound)**		22-Mar-12	0	222	222
CLIR	**ClearSign Technologies, Inc.**	20-Apr-11	25-Apr-12	455	250	705
IPWR	**Ideal Power Inc.**	1-Dec-12	21-Nov-13	29	20	49
WATT	**Energous Corporation**	17-May-13	28-Mar-14	17	8	25
RESN	**Resonant**	1-Jun-13	29-May-14	333	167	500
EYES	**Second Sight (Vivani Medical)**		19-Nov-14	0	5	5
PLSE	**Pulse Biosciences, Inc.**	6-Nov-14	18-May-16	375	250	625
AREN	**The Arena Group Holdings, Inc.**	4-Apr-17	19-Jul-17	65	65	130
CUE	**Cue Biopharma, Inc.**	1-Dec-16	2-Jan-18	200	133	333
PRVB	**Provention Bio, Inc.**	1-Feb-17	19-Jul-18	400	250	650
EXOZ	**Exozymes Inc.**		12-Nov-24	0	125	125
				2,828	**4,622**	**7,450**

A significant feature of the tool is the incorporation of tax calculations, specifically considering the potential benefits of Section 1202 of the Internal Revenue Code related to Qualified Small Business Stock (QSBS).[15] Section 1202 allows non-corporate investors to potentially exclude a significant portion, or even 100% in some cases, of the capital gains tax on the sale of QSBS held for five or more years.[16] To be eligible, the stock must have been issued by a domestic C-corporation after August 10, 1993, and the issuing company must have had aggregate gross assets of $50 million or less immediately following the issuance.[19] Additionally, at least 80% of the company's assets must have been actively used in a qualified trade or business.[19] The model first assesses the eligibility of revenues from selling stocks as QSBS based on these criteria. Following the eligibility assessment, the model automatically checks the dates of stock issuance to apply the correct 1202 exclusion rate in effect at that time. These rates vary: stock issued between August 11, 1993, and February 17, 2009, is eligible for a 50% exclusion; stock issued between February 18, 2009, and September 27, 2010, for a 75% exclusion; and stock issued after September 27, 2010, for a 100% exclusion, up to certain limits.[19] Finally, after determining the eligible QSBS gain and applying the appropriate exclusion rate, the tool applies the corresponding capital gains tax rates at both the state and federal levels, taking into account the specified state of the investor. The inclusion of these QSBS benefits can substantially enhance the after-tax returns for investors in qualifying small businesses, provided they meet the holding period and other requirements.[20] However, it is important to note that state tax treatment of QSBS benefits can vary, impacting the overall tax advantages depending on the investor's location.[19]

[15] Inside the Qualified Small Business Stock (QSBS) Exclusion | Morgan Stanley, https://www.morganstanley.com/content/dam/msdotcom/atwork/qualified-small-business-stock/QSBS-Exclusion.pdf

[16] QSBS Capital Gains Exclusion: What is Section 1202? | U.S. Bank, https://ascent.usbank.com/private-capital-management/ascent-resources-and-insights/business-founders/section-1202.html

Table 6. *1202 eligibility*

	Tranche 1		Tranche 2		Tranche 3		End of Cycle	
Ticker	PP	IPO	PP	IPO	PP	IPO	PP	IPO
HEPH	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Eligible	Eligible	Eligible	Eligible
MTEX		Not Eligible		Not Eligible		Eligible		Eligible
LIPD	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Eligible	Eligible
MDVN		Not Eligible		Not Eligible		Eligible		Eligible
VHC	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Eligible	Eligible	Eligible	Eligible
UNXL		Not Eligible		Not Eligible		Not Eligible		Eligible
TBCH		Not Eligible		Not Eligible		Eligible		Eligible
CLIR	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Eligible	Eligible	Eligible	Eligible
IPWR	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Eligible	Eligible
WATT	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Eligible	Eligible	Eligible	Eligible
RESN	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Eligible	Eligible	Eligible	Eligible
EYES		Not Eligible		Not Eligible		Not Eligible		Eligible
PLSE	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Eligible	Eligible	Eligible	Eligible
AREN	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Eligible	Eligible	Eligible	Eligible
CUE	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Eligible	Eligible
PRVB	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Not Eligible	Eligible	Eligible
EXOZ		Not Eligible		Not Eligible		Not Eligible		Not Eligible

5. Key Results from Simulations

5.1 Buy and Hold Strategy

Using the "Buy and Hold" profile parameters, the backtesting simulation was applied across 17 portfolio companies, with an investment of $1,000 per company per round (PP and IPO)—a total of $28,000. The strategy applied high gain thresholds and low early sell percentages, aiming to lock in large gains early only if thresholds were reached in the investment cycle.

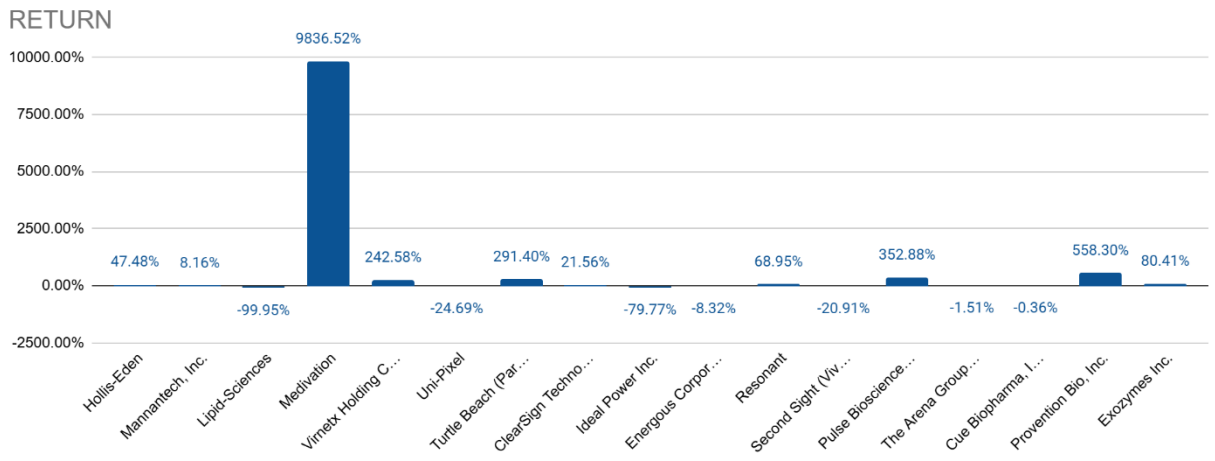
The portfolio-wide performance under this strategy resulted in a Total Simulated Revenue of $151,746 and a Final Realized Gain of 441.59%. The Internal Rate of Return (IRR) was calculated at 24.23%. Over the simulation period, a total of 5,815 shares were sold, and an additional 1,635 shares were liquidated at the end of the cycle. The tranche-level distribution showed that 13.6% of the total revenue was captured in the first tranche (1–2 years), with the remainder realized by year 10.

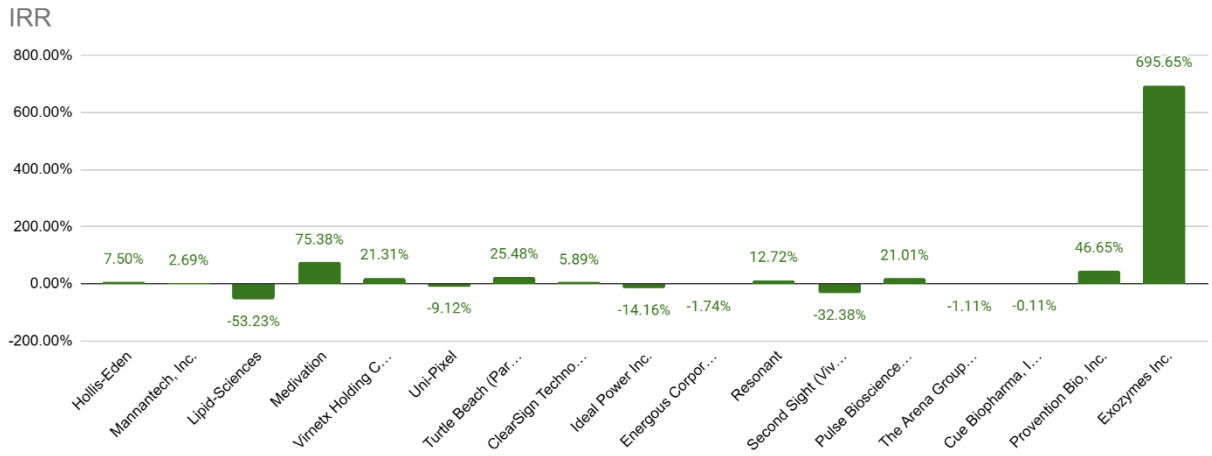
Table 7. *Scenario summary for Buy and Hold Strategy*

Action taken	Shares sold	Total Revenue	1202 eligible	Revenue after taxes (est.)	Return after tax
Sell when threshold achieved	2,020	$20,868	$1,990	$16,250	
Sell at year 10	3,795	$117,867	$117,164	$117,700	
End of Cycle Sell	1,635	$12,909	$11,946	$12,680	
	7,450	**$151,644**	**$131,100**	**$146,630**	**423.68%**

	Before Tax	After Tax
TOTAL RETURN	**441.59%**	**423.68%**
IRR	**24.23%**	**22.61%**

Observations from the simulation indicate that the "Buy and Hold" strategy primarily focused on capturing substantial early gains only when the high gain thresholds were reached. The majority of the portfolio was held until year 10 for potential large returns. Top-performing companies under this strategy included Medivation, Pulse Biosciences, Virnetx, and Provention Bio, all of which triggered multiple gain thresholds. Conversely, companies such as Lipid-Sciences, Uni-Pixel, Ideal Power, Energous and Second Sight did not trigger any exits before the final liquidation, leading to realized losses or minimal returns.





The implications of this strategy suggest that it is designed to maximize capital growth by seeking outsized returns in later investment stages. While it generated the highest realized gain among the three strategies, it came at the cost of a higher number of underperforming or flat investments. The success of this approach heavily depends on the presence of a few exceptional performers and the discipline to exit positions swiftly once the high gain thresholds are achieved. This profile is best suited for investors with a higher risk tolerance, a long investment horizon, and a focus on aggressive wealth accumulation through asymmetric return opportunities, consistent with the long-term nature of venture capital.[17]

5.2 Balanced Strategy

Using the medium-risk investment profile parameters—defined by medium-term gain thresholds and sell percentages, the simulation modeled capital deployment across all 17 historical MDB portfolio companies. Each investment assumed an equal allocation of $1,000 in both the Private Placement (PP) and Initial Public Offering (IPO) rounds, totaling $28,000 across the portfolio.

The portfolio-wide performance for the balanced strategy showed a Total Simulated Revenue of $94,076 and a Final Realized Gain of 236%. The IRR achieved was 49.25%. A total of 6,517 shares were sold throughout the simulation, with 933 shares liquidated at the end of the cycle. The tranche-level distribution revealed that short-term (T1) exits accounted for $24,846 from 2,680 shares, medium-term (T2) sales generated $27,469 from 2,060 shares, and the long-term tranche (T3) drove the largest single tranche gain of $37,173.

[17] Private Equity vs. Venture Capital: Key Differences Explained – Rundit, https://rundit.com/blog/private-equity-and-venture-capital-key-differences/

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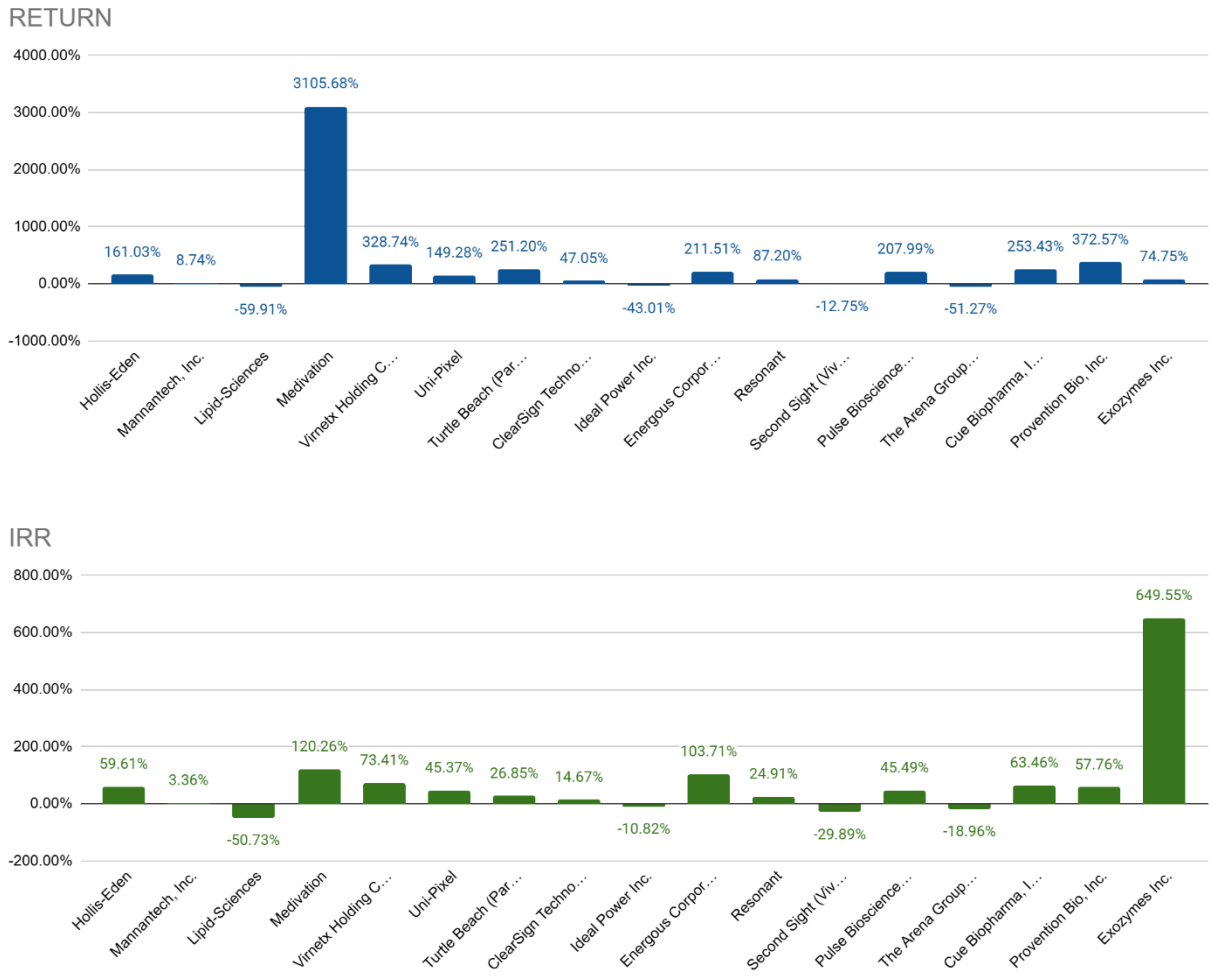
Table 8. *Scenario summary for Balanced Strategy*

Action taken	Shares sold	Total Revenue	1202 eligible	Revenue after taxes (est.)	Return after tax
Sell strategy within year 1-2	2,680	$24,846	$0	$18,933	
Sell strategy within year 3-5	2,060	$27,469	$0	$20,932	
Sell at year 10	1,777	$37,173	$36,821	$37,089	
End of Cycle Sell	933	$4,464	$3,639	$4,267	
	7,450	**$93,952**	**$40,460**	**$81,221**	**190.07%**

	Before Tax	After Tax
TOTAL RETURN	**235.54%**	**190.07%**
IRR	**49.25%**	**28.47%**

Observations indicate that the balanced strategy effectively captured both near-term gains and mid-to-long-term value appreciation. Short-term exits were anchored by early gain realization in companies like Hollis-Eden, Pulse Biosciences, and Virnetx. Medium-term sales leveraged solid mid-cycle growth, with substantial gains from names such as UniPixel, Provention Bio, and Energous. The long-term tranche confirmed the value of sustained positions, with Pulse Biosciences and Medivation contributing significantly due to their substantial long-horizon returns. The top performers overall included Medivation, Pulse Biosciences, Provention Bio, and Virnetx, which consistently hit medium-risk gain thresholds across multiple tranches. Underperforming positions such as Lipid-Sciences, ClearSign, Cue Biopharma, and Second Sight did not trigger any sales until final liquidation and contributed to the lowest return segments. This strategy aligns with the principles of a balanced investment approach, which seeks a mix between capital preservation and growth.[18]

[18] Balanced Investment Strategy: Definition and Examples - Investopedia, https://www.investopedia.com/terms/b/balancedinvestmentstrategy.asp



The implications of the balanced strategy highlight its effectiveness in achieving a strong balance between risk and reward, delivering over 235% in realized gains with controlled portfolio turnover. This strategy's core advantage lies in its flexibility—capturing growth across different market phases while still protecting capital with end-of-cycle liquidation. It is suitable for investors with a moderate risk tolerance and a desire for both near-term returns and long-term growth.

5.3 Active Management Strategy

The "Active Management Strategy" simulation also involved a $28,000 investment across the 17 portfolio companies ($1,000 per company per round). This strategy applied lower gain thresholds and a more gradual selling approach across tranches, aligning with a risk-averse investor seeking stable, long-term returns and downside protection. A key characteristic of this strategy was the selling of 50% of positions early.

The portfolio-wide performance under active management resulted in a Total Simulated Revenue of $95,762 and a Final Realized Gain of 242%. The IRR achieved was 44.53%. A total of 6,495 shares were sold throughout the simulation, with 955 shares liquidated at the end of the cycle. The tranche-level distribution showed that short-term exits (T1) captured $30,712 from 3,382 shares, medium-term sales (T2) brought in $16,686 from 1,396 shares, and the long-term tranche (T3) generated the largest single-tranche revenue of $43,123 from 1,717 shares. End-of-cycle liquidation of 955 shares provided $5,238. Active management involves actively making investment decisions to potentially outperform the market.[19]

Table 9. *Scenario summary for Active Management Strategy*

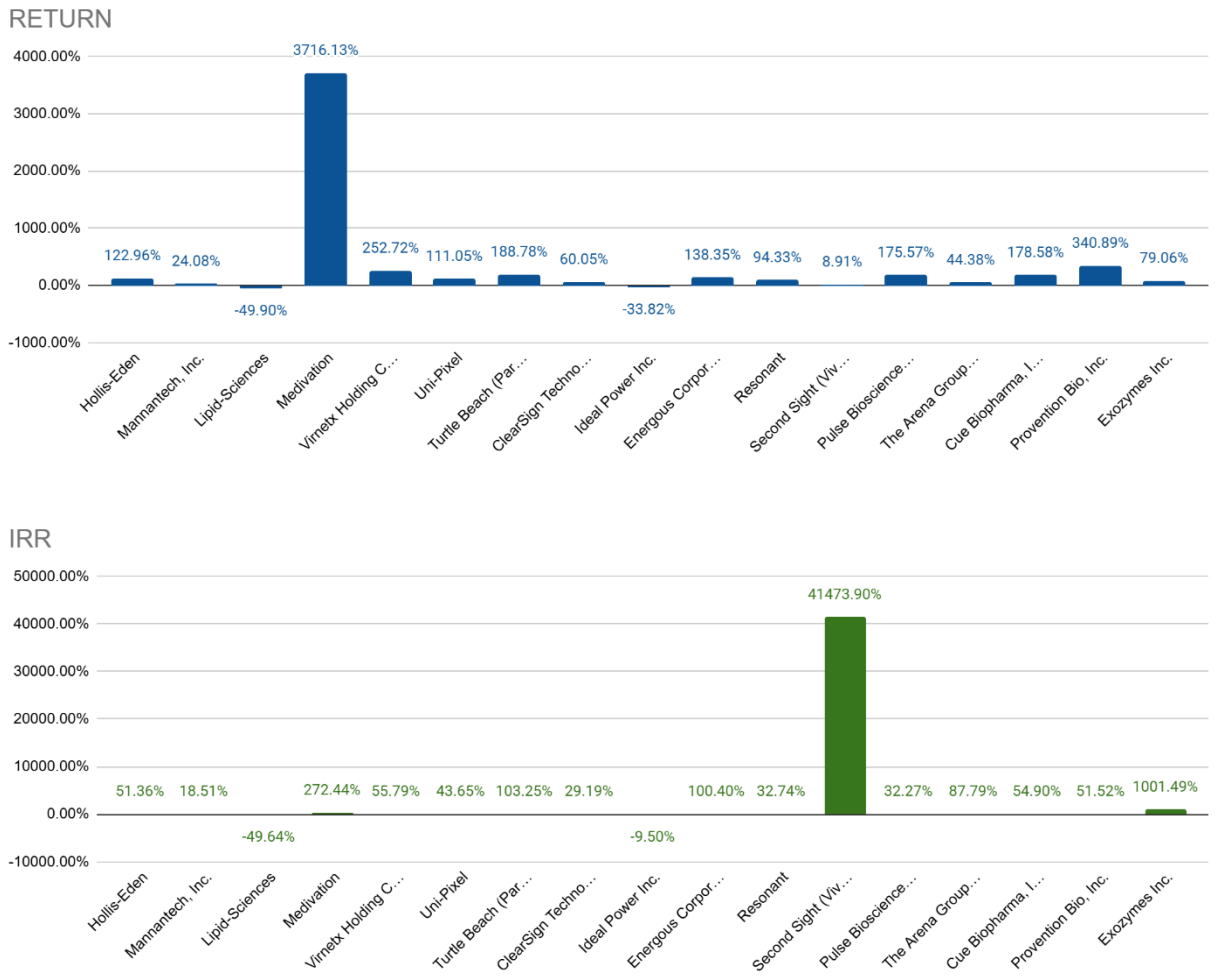
Action taken	Shares sold	Total Revenue	1202 eligible	Revenue after taxes (est.)	Return after tax
Sell strategy within year 1-2	3,382	$30,712	$0	$23,402	
Sell strategy within year 3-5	1,396	$16,689	$2,001	$13,015	
Sell at year 10	1,717	$43,123	$42,778	$43,041	
End of Cycle Sell	955	$5,133	$4,445	$4,969	
	7,450	**$95,657**	**$49,225**	**$84,428**	**201.53%**

	Before Tax	After Tax
TOTAL RETURN	**241.63%**	**201.53%**
IRR	**44.53%**	**26.91%**

Observations indicate that the active management strategy underscored the strength of disciplined early exits at lower thresholds while still preserving exposure to long-term gains. Short-term exits were enabled by modest thresholds that triggered early monetization of winners like Hollis-Eden, Virnetx, and Pulse Biosciences. Medium-term sales were driven by sustained performance from names like Provention Bio, WATT, and Turtle Beach. Long-term tranches demonstrated that even actively managed portfolios can yield significant upside when patient with select holdings such as Medivation and Pulse Biosciences. End-of-cycle liquidation represented underperformers that never met even the actively managed gain

[19] Active Management Definition, Investment Strategies, Pros & Cons - Investopedia, https://www.investopedia.com/terms/a/activemanagement.asp

thresholds, including Lipid-Sciences, ClearSign, and Second Sight. Despite its active approach, the strategy captured strong absolute gains by leaning into early realizations while still participating in longer-term upswings.



The implications of the active management profile show that it delivered nearly 2.5x returns while emphasizing early gains and minimizing prolonged exposure to underperforming assets. Its approach of selling 50% of positions early provides strong downside protection and consistent capital rotation. This strategy best suits investors prioritizing capital preservation, seeking early liquidity, and minimizing drawdowns from long-tailed venture outcomes. While it slightly underperformed the medium-risk profile in raw return, it significantly reduced unrealized risks, making it an ideal baseline or core allocation strategy. For venture-style portfolios with uncertain liquidity windows, the active management

approach offers a repeatable, risk-managed framework that still captures meaningful upside while limiting losses from stagnant or volatile investments.

Table 10. *Summary of all Strategies*

Metric	Buy and Hold	Balanced Strategy	Active Management
Total Simulated Revenue	$151,746	$94,076	$95,762
Final Realized Gain (%)	441.95%	236%	242%
IRR (%)	24.23%	49.25%	44.53%
Total Shares Sold	5,815	6,517	6,495
Total Shares Liquidated (End)	1,635	933	955

6. Limitations

The backtesting analysis, while providing valuable insights, is subject to several limitations. First, the model does not incorporate any time value adjustment for money. Factors such as inflation, opportunity cost, and the present value of future returns are not considered, which could impact the assessment of longer-term strategies. Second, the model assumes fixed investment amounts of $1,000 per company per round (PP and IPO), regardless of the company's valuation or stage of development. This simplification might not reflect the varying investment sizes and strategies employed by real-world investors. Third, the results are solely based on historical performance data and do not guarantee future outcomes. Market conditions and company-specific factors can change significantly over time, potentially affecting the actual performance of these strategies.[20]

Furthermore, the sell logic is based on hitting discrete, predefined gain thresholds. In reality, exit decisions are often influenced by a more complex set of factors, including the competitive landscape, merger and acquisition signals, and broader macroeconomic shifts, rather than solely relying on price multiples.[21] The model also assumes full liquidity and the ability to execute sales at the desired prices, which may not always be achievable in real-world market conditions, especially for large blocks of illiquid venture capital shares. Another limitation is the absence of reinvestment or capital recycling in the model. Proceeds from sales are not reinvested, thus excluding potential compounding effects from redeploying capital into new opportunities or follow-on investments. Finally, the rule of

[20] Backtesting: Definition, How It Works, and Downsides - Investopedia, accessed April 30, 2025, https://www.investopedia.com/terms/b/backtesting.asp

[21] Backtesting - Definition, Example, How it Works - Corporate Finance Institute, accessed April 30, 2025, https://corporatefinanceinstitute.com/resources/data-science/backtesting/

liquidating all remaining positions at the 10-year mark, irrespective of their performance, might not reflect actual investor behavior, where decisions to hold, sell, or write off investments can be more nuanced and extend beyond a fixed timeframe.[22] These limitations are inherent in backtesting methodologies, which rely on historical data and often involve simplifications of complex real-world market dynamics.[24]

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7. Conclusion

This comprehensive backtesting analysis demonstrates the potential benefits of a dynamic, tranche-based approach to venture capital exit strategies compared to the traditional, static "all-or-nothing" model. By providing three distinct investor scenarios – "Buy and Hold", "Balanced", and "Active Management" – across 17 "Big Idea" companies MDB Capital has taken public, the study reveals that strategic exits tailored to risk preferences can effectively capture value at multiple points throughout the investment lifecycle, providing investors with meaningful options for liquidity and risk management.

While the "Buy and Hold" strategy generated the highest absolute gain, its lower IRR and reliance on a few outsized winners highlight the trade-off with capital efficiency and increased risk. In contrast, the "Balanced" and "Active Management" strategies delivered strong realized gains with superior IRRs, showcasing the effectiveness of systematically harvesting gains across short, medium, and long-term tranches. These findings align with existing research in venture capital, which indicates that portfolio returns are often skewed and that active, data-driven management can improve risk-adjusted outcomes.[23]

The framework presented in this analysis addresses key limitations of traditional venture capital models by introducing interim liquidity, customizable exit logic, and rigorous, scenario-based analysis. The methodology incorporates best practices in financial backtesting, such as mitigating look-ahead bias and utilizing actual historical price data, to ensure analytical integrity. The inclusion of tax optimization through Section 1202 QSBS benefits further enhances the practical relevance of the simulation for investors.

Despite the inherent limitations of backtesting, this framework offers a valuable illustration of how different investor profiles and sell strategies can impact realized gains in venture

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[22] Private Equity vs. Venture Capital: Key Differences Explained - Rundit, accessed April 30, 2025, https://rundit.com/blog/private-equity-and-venture-capital-key-differences/

[23] Active Management Definition, Investment Strategies, Pros & Cons - Investopedia, accessed April 30, 2025, https://www.investopedia.com/terms/a/activemanagement.asp

capital. The results underscore the importance of timing, risk tolerance, and disciplined execution in venture portfolio management. By customizing exit thresholds and tranche sizing to align with individual investor preferences, portfolio managers can potentially enhance realized returns, improve liquidity cycles, and manage risk more effectively over the lifecycle of a venture portfolio. The tool developed for this analysis holds promise for further refinement and application in real-time portfolio optimization and client advisory discussions.

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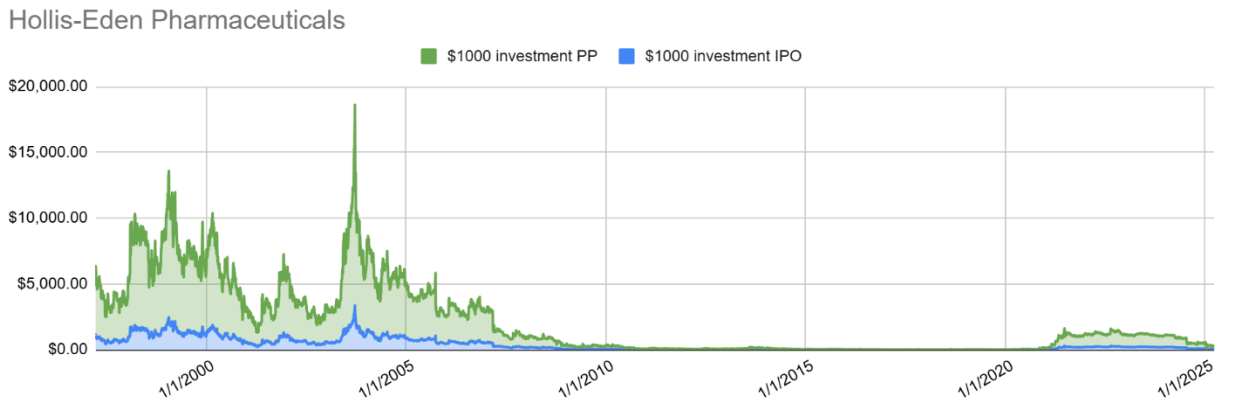
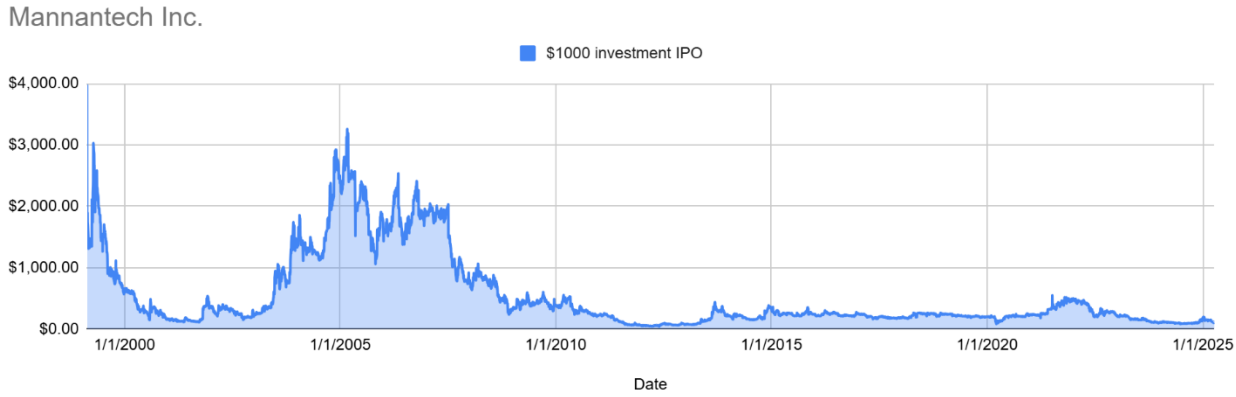
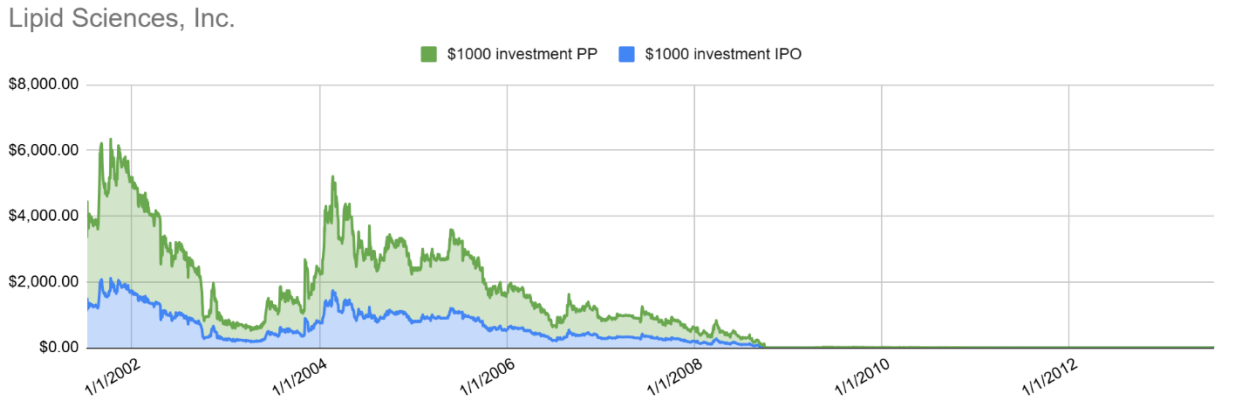
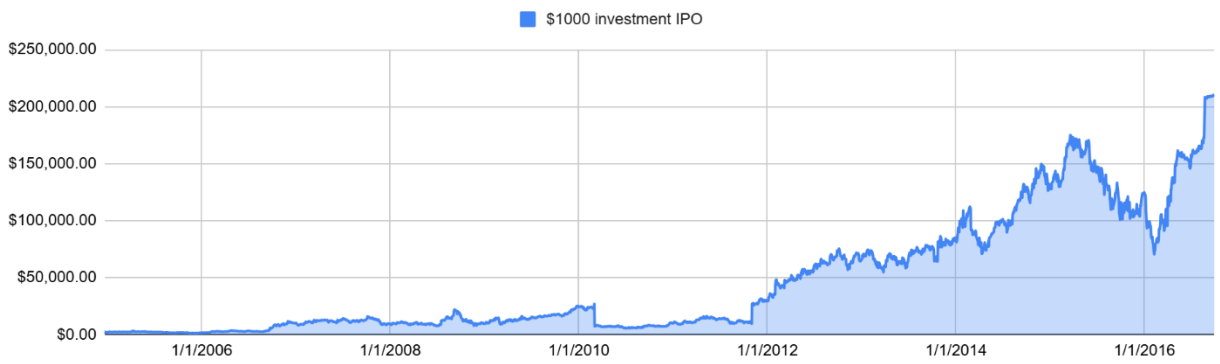
8. Annex – Performance graphs



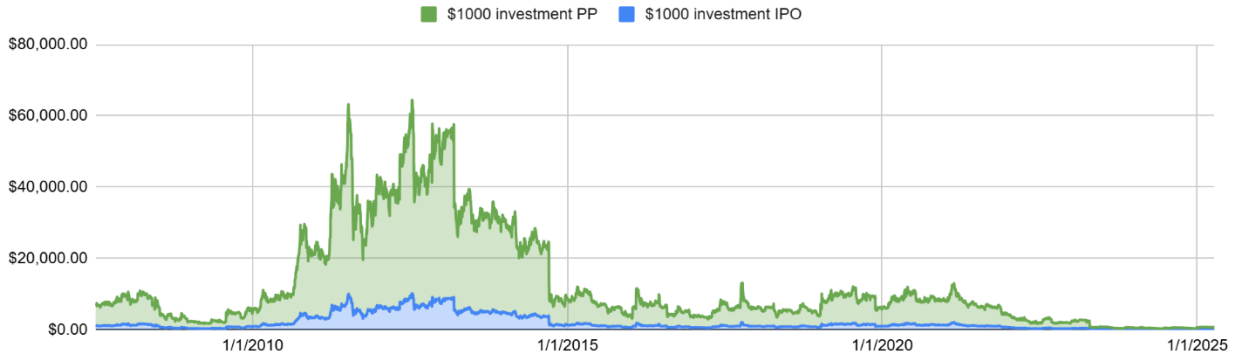




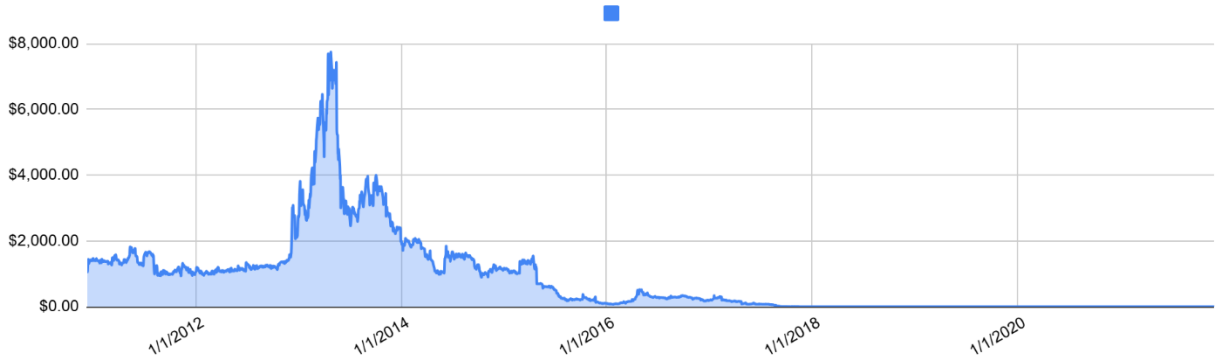
Medivation



Virnetx Holding Corp.

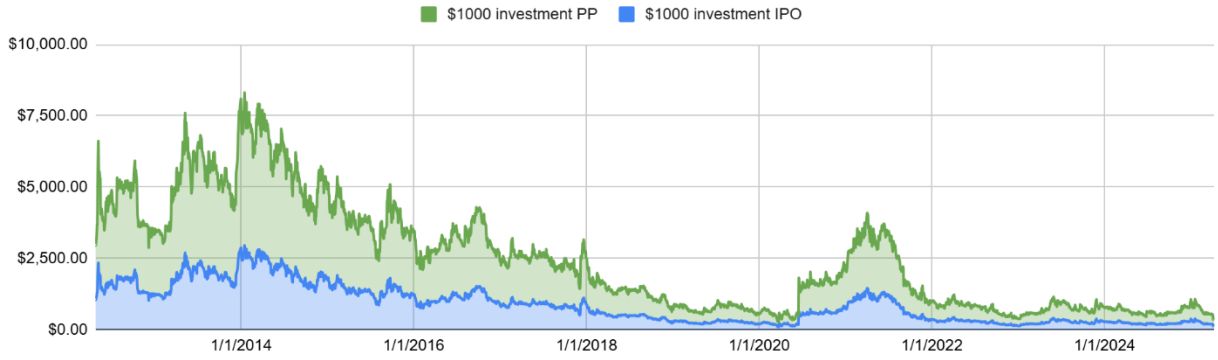


Uni-Pixel

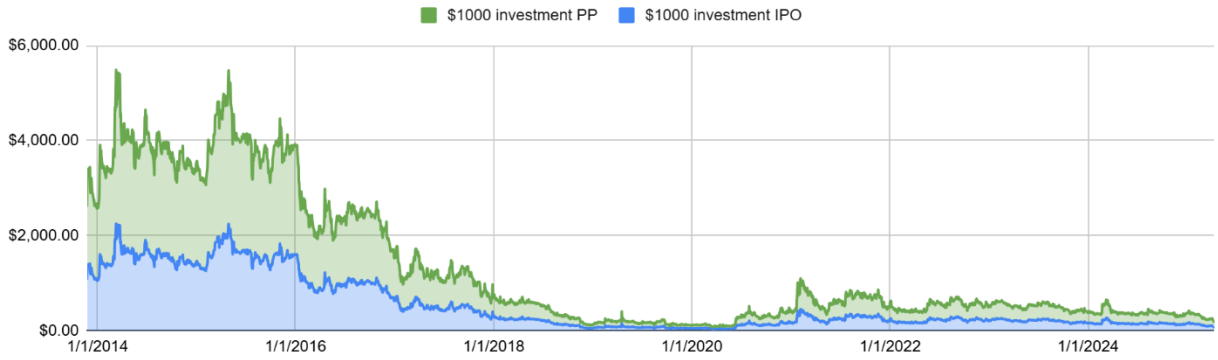


Parametric Sound (Turtle Beach)

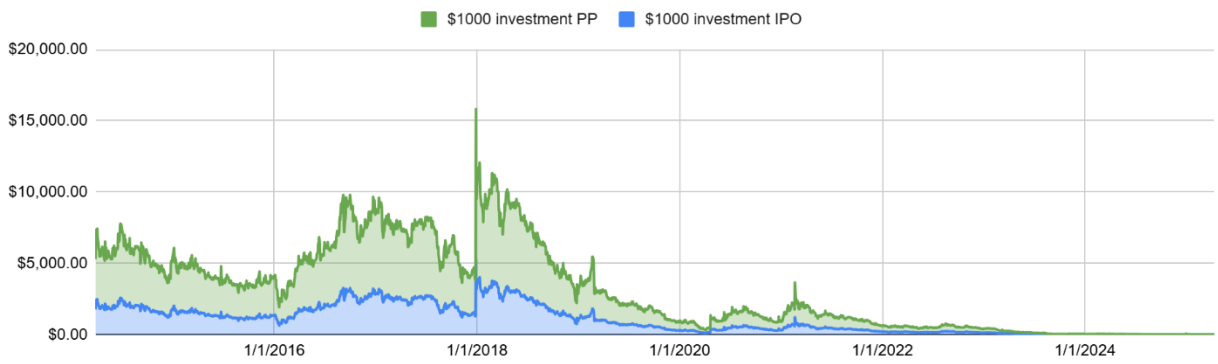
ClearSign Technologies Corp.



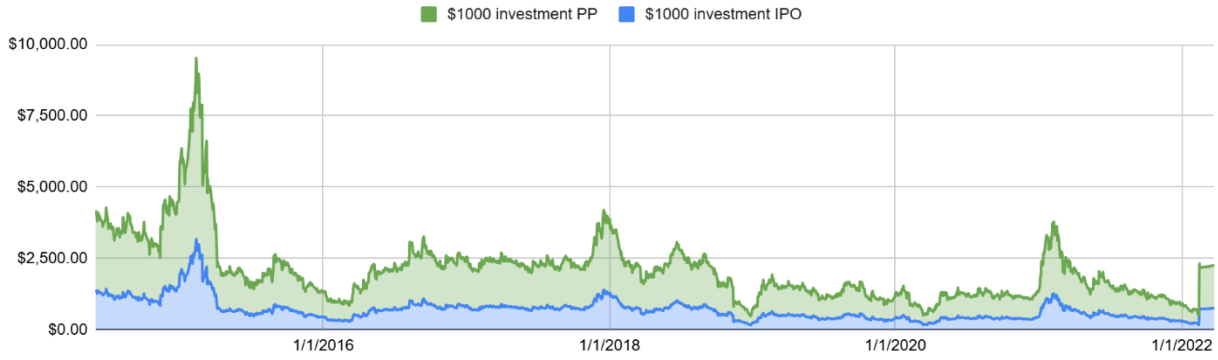
Ideal Power Inc.



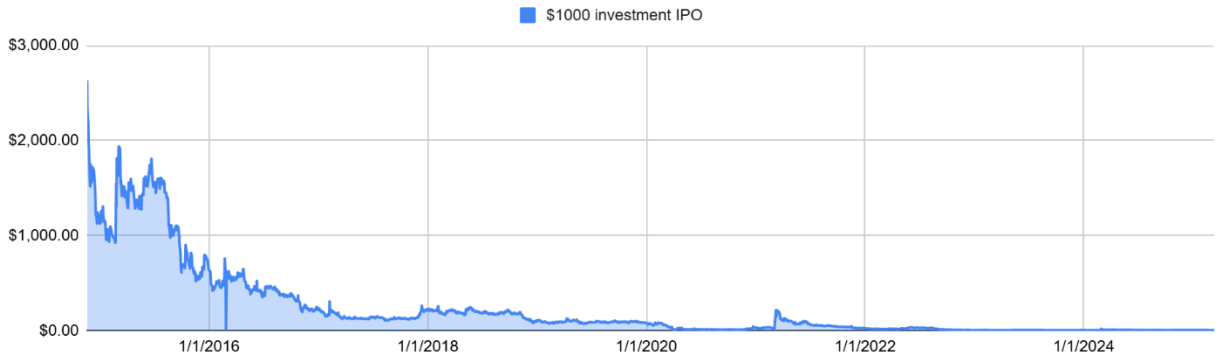
Energous Corp.



Resonant



Second Sight (Vivani)



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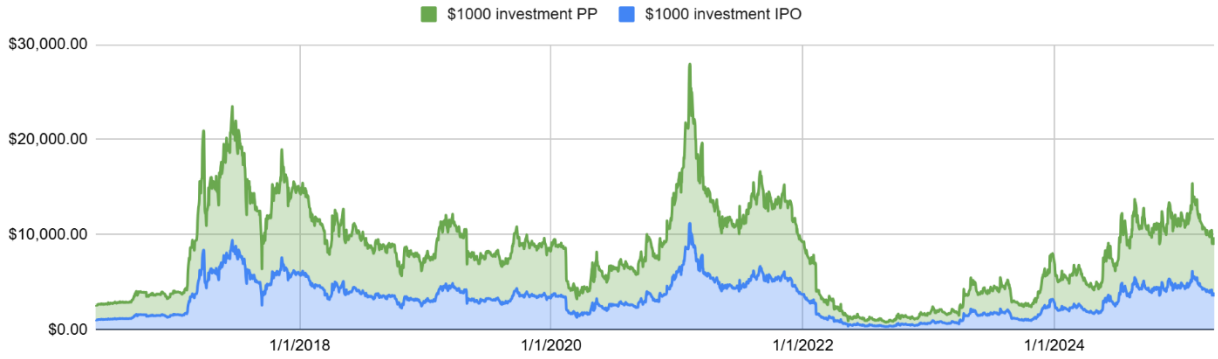
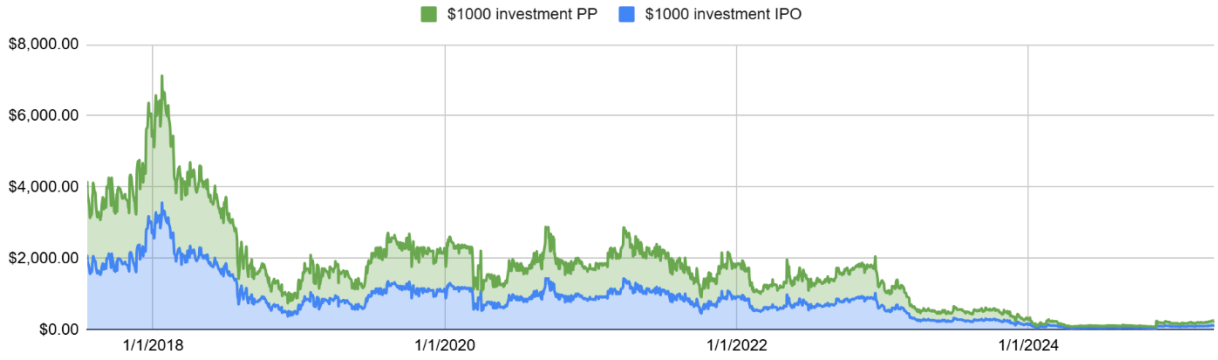
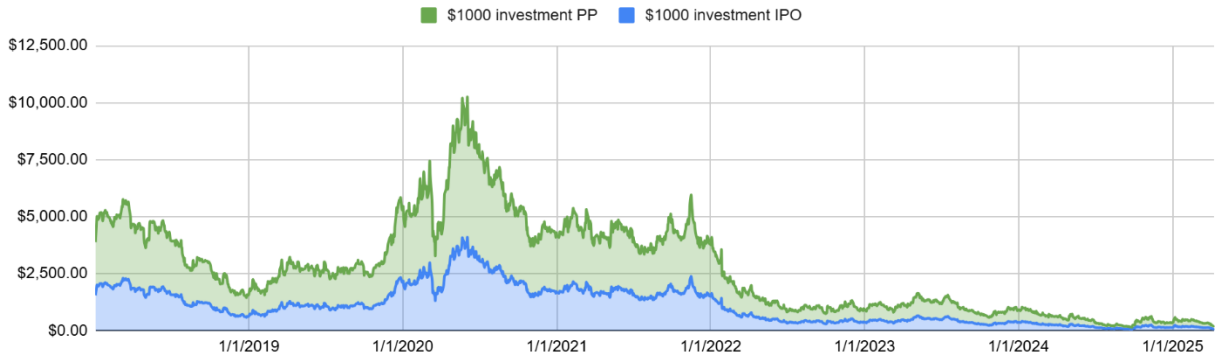
Pulse Biosciences



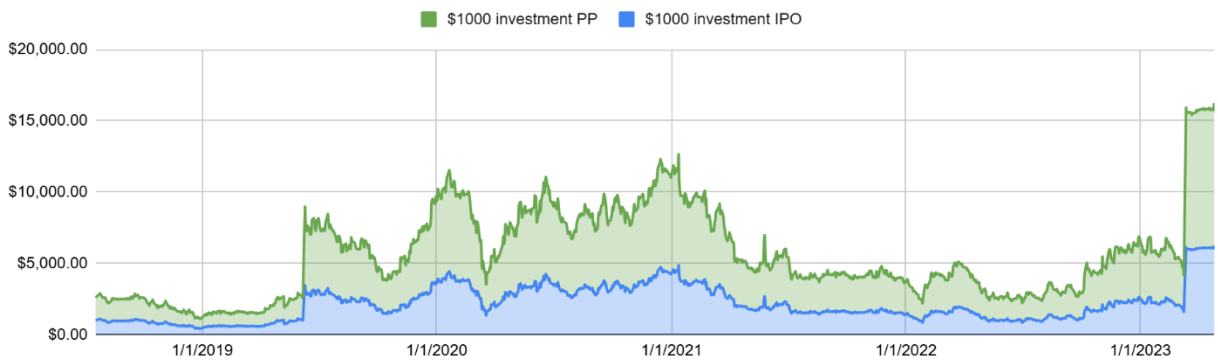
TheMaven (The Arena Group Holdings)



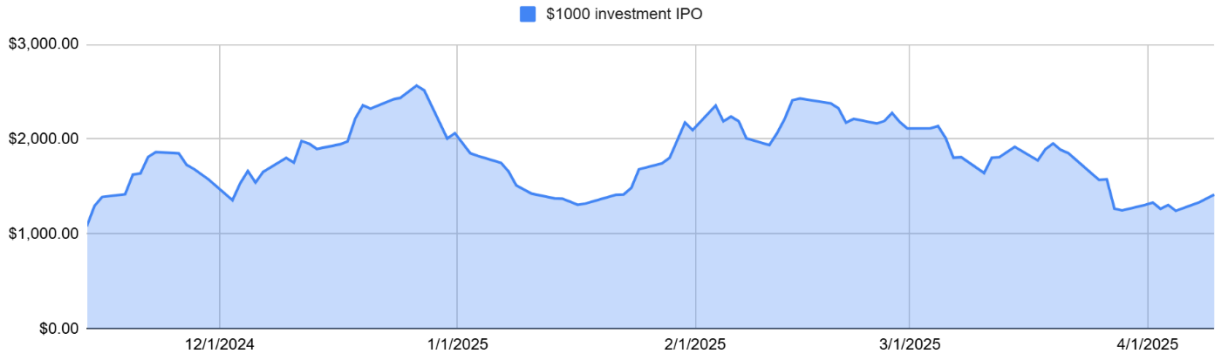
Cue Biopharma



Provention Bio



ExoZymes



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