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The Pharma/Biotech Dilemma

How current Small and Microcap Index weightings in the pharma & biotech industries are creating a dilemma for traditional value managers.

"You take the blue pill, the story ends; you wake up in your bed and believe whatever you want to believe.

You take the red pill, you stay in Wonderland and I show you how deep the rabbit hole goes.

Remember, all I'm offering is the truth, nothing more."

-Morpheus "The Matrix"

"Spoiler Alert!" The 1999 film, The Matrix, takes place in a dystopian future where humanity is trapped in a simulated reality designed by intelligent robots that harvest humans as an energy source. Morpheus, who has escaped this alternative reality offers Neo, who is still trapped in the simulation, the opportunity to learn the truth by swallowing a red pill.

Much like Neo we find ourselves in a similar dilemma when it comes to the pharma/biotech space and as it relates to the current weightings in the Russell 2000 Value and Microcap Value Indices:

Do we take the blue pill and believe what we want to believe as value managers about the industry, or do we take the red pill and dive down the rabbit hole in search for a deeper truth?

Since 2010 the number of drug companies[1] has doubled and represents 16% of all stocks (see Exhibit 1 on next page). We find that a majority of pharma/biotech companies that have gone public since then (75% to 80%) are small cap in nature[2].

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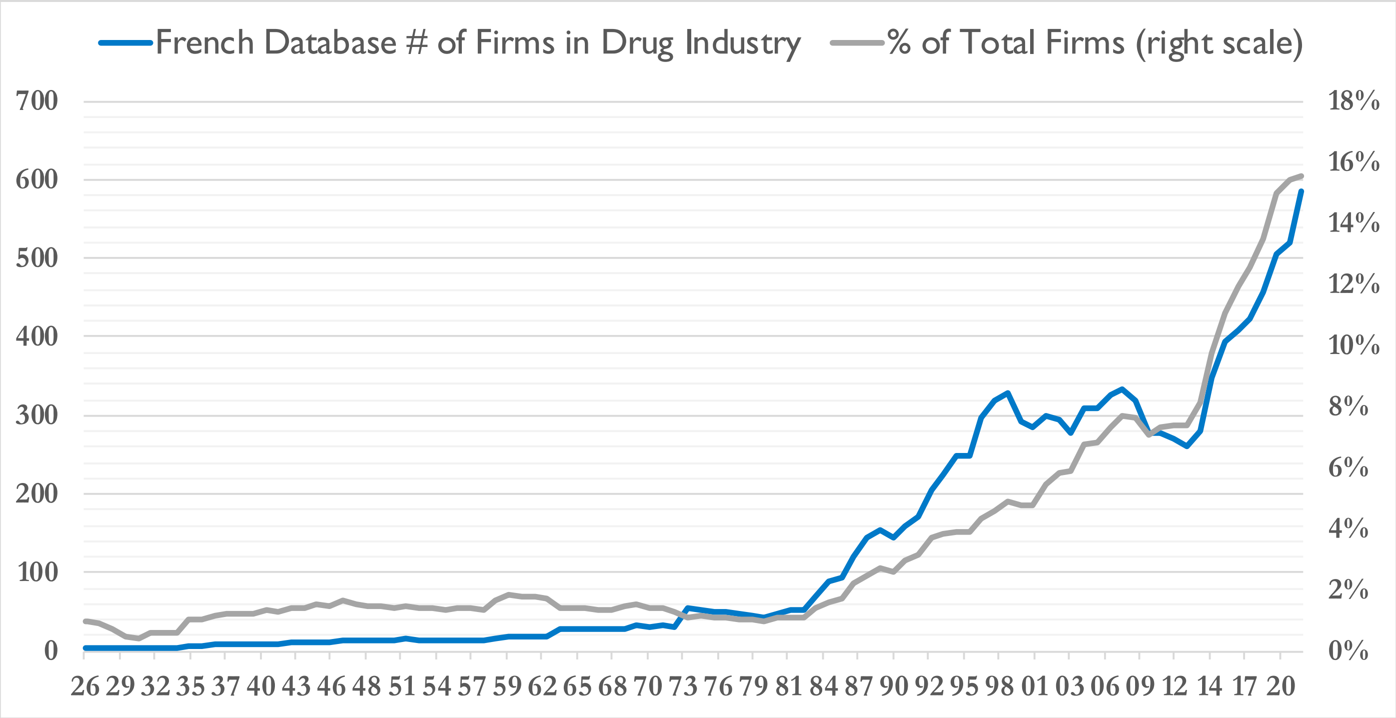
[1]Classified in the French database as Drugs Pharmaceutical Products
[2]Foundry Small Cap Database in FactSet includes stocks that are $80 million to $6 billion in market capitalization

Exhibit 1



Source: FactSet & Foundry Partners LLC

This explosion of pharma/biotech stocks, particularly within the small cap universe, has created an interesting dynamic among the Russell Indices. The Russell 2000 Value Index currently holds 160 pharma/biotech stocks, representing a 7% weighting. While the Russell Microcap Value Index holds 283 stocks, representing a 19% weighting.

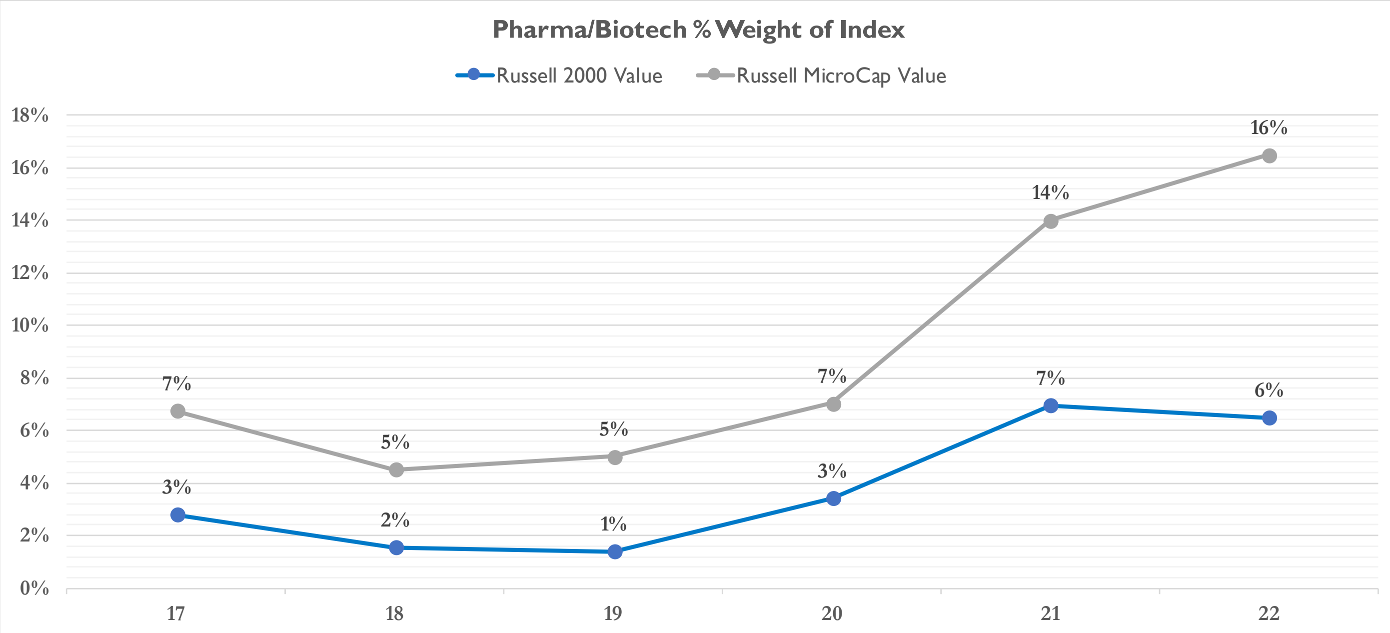
These weightings are nearly 2x and 4x the indices' weightings after the rebalances of 2020 and 2018, respectively (see Exhibit 3 on the following page).

Exhibit 2

Index	Total # of Stocks	# of Pharma/Biotech	Index Weight (%)
Russell 2000 Value	1,394	160	7%
Russell Microcap Value	1,256	283	19%

Source: FactSet & Foundry Partners LLC; As of August 31st, 2022

Exhibit 3



Source: FactSet & Foundry Partners LLC; Annual observations are June 30th period-end

Out of the 160 names found in the Russell 2000 Value Index, only 9 stocks have positive earnings and only 16 have positive cash flows. Additionally, 46 stocks (or 29%) started trading within the past two years. We find a similar dynamic within the Russell Microcap Value Index: only 9 stocks have positive earnings, 17 have positive cash flows and 31% started trading within the past two years. See Exhibit 4.

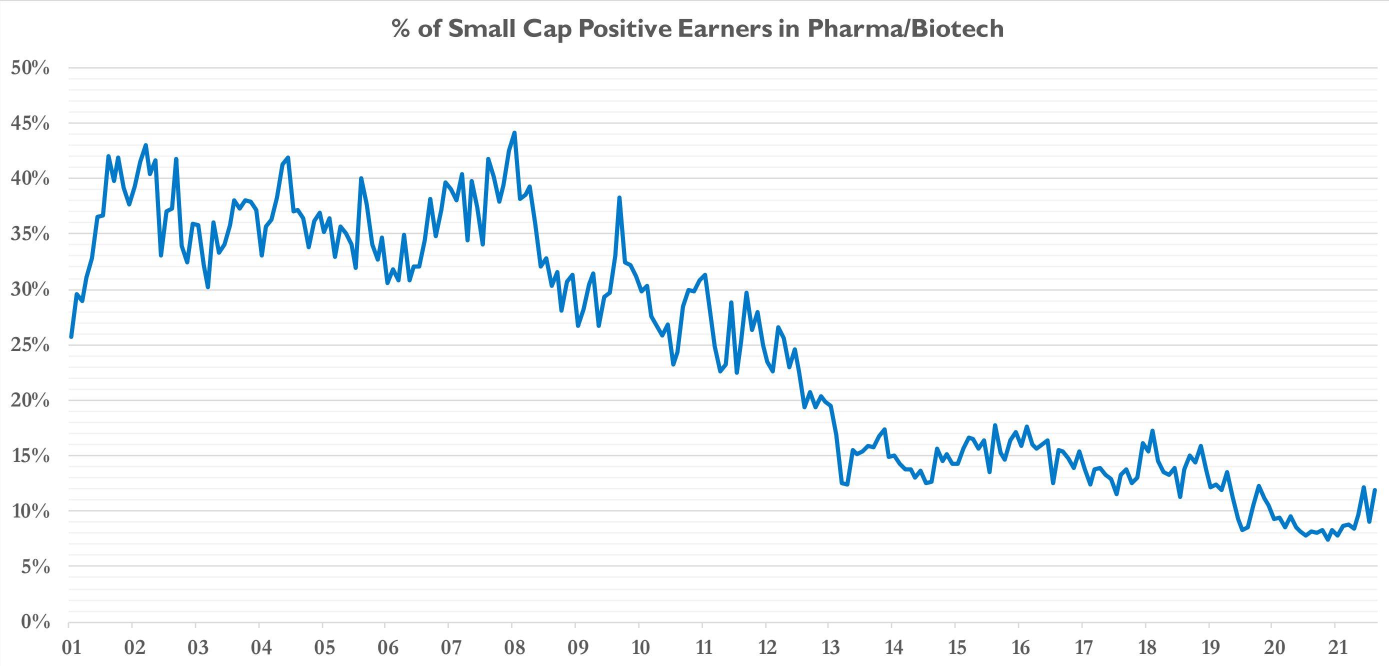
Exhibit 4

Pharma/Biotech Industry	NTM P/E > 0	P/CF > 0	< 2 Years Trading History
Russell 2000 Value	9	16	46
Russell Microcap Value	9	17	88

Source: FactSet & Foundry Partners LLC; As of August 31st, 2022

The percent of positive earning small cap companies found within this space has declined significantly since 2008 as shown in Exhibit 5 on the next page.

Exhibit 5



Source: FactSet & Foundry Partners LlC

So how did a large swath of negative earning and negative cash flow companies make their way into the value indices? Russell utilizes a price-to-book value metric when screening. See explanation below from the Russell 2000 Value factsheet.

"It includes those Russell 2000 companies with relatively lower price-to-book ratios, lower I/B/E/S forecast medium term (2 year) growth and lower sales per share historical growth (5 years)."[3]

Price-to-book is one of the oldest factors used to define value. The metric has done a remarkable job doing just that for a better part of the last century. The factor does have some setbacks, however. For example, the rise of share repurchases and the potential for understated intangible assets (i.e. brands purchased a long time ago) have understated the true underlying book value of assets over the years for some companies.

If share repurchases have the potential to understate, then the reverse must be true as well – share issuances have the potential to overstate.

We believe that has occurred in the pharma/biotech space and one of the reasons why most of these companies appear attractive from a price-to-book standpoint, especially given the most recent period of underperformance.

Close to 63% of the pharma/biotech stocks in the Russell 2000 Value and roughly 66% of stocks in the Russell Microcap Value have raised 50% or more of their book value from issuances within the past three years[4]. These equity issuances have occurred during a time where low interest rates and monetary stimulus across the globe created a euphoric period for long-duration assets. Stock issuances are vital for any pharma/biotech company to sustain cash burn while they prove out and test drugs. For these firms, tapping the debt markets would be too expensive given the lack of real assets outside of patents and R&D. This inflated book value does not equate to the characteristics of a truly undervalued company, rather it exhibits a need for funding to prove out a concept. As a result, analyzing traditional fundamentals on most pharma/biotech companies is a fool's errand.

[3]FTSE/Russell Indices
[4]FactSet & Foundry Partners, LLC; as of August 31st, 2022

If fundamentals are not a big driver, then what drives performance?

In our opinion the two largest factors are:

1. Takeouts at significant premiums (acquisition of pipeline by larger players)

2. Outcome of clinical trials & new drug application (NDA) approvals

The former is extremely difficult to predict. The latter is binary in nature, but possible to examine. It requires, however, an intimate knowledge of the chemistry and processes behind the drugs along with a deep analysis of each major clinical trial with outcome probabilities and payoffs assigned to those trials. Even with this deep understanding, it remains challenging to isolate drugs that will achieve final approval given the probability of success (POS). In Exhibit 6 we highlight a table from a report written by a group of authors from MIT that analyzed a data set of 406,038 drug and vaccine trials from January 1, 2000 to October 31, 2015. The POS from Phase 1 to approval for all clinical trials analyzed was less than 14%!

Exhibit 6

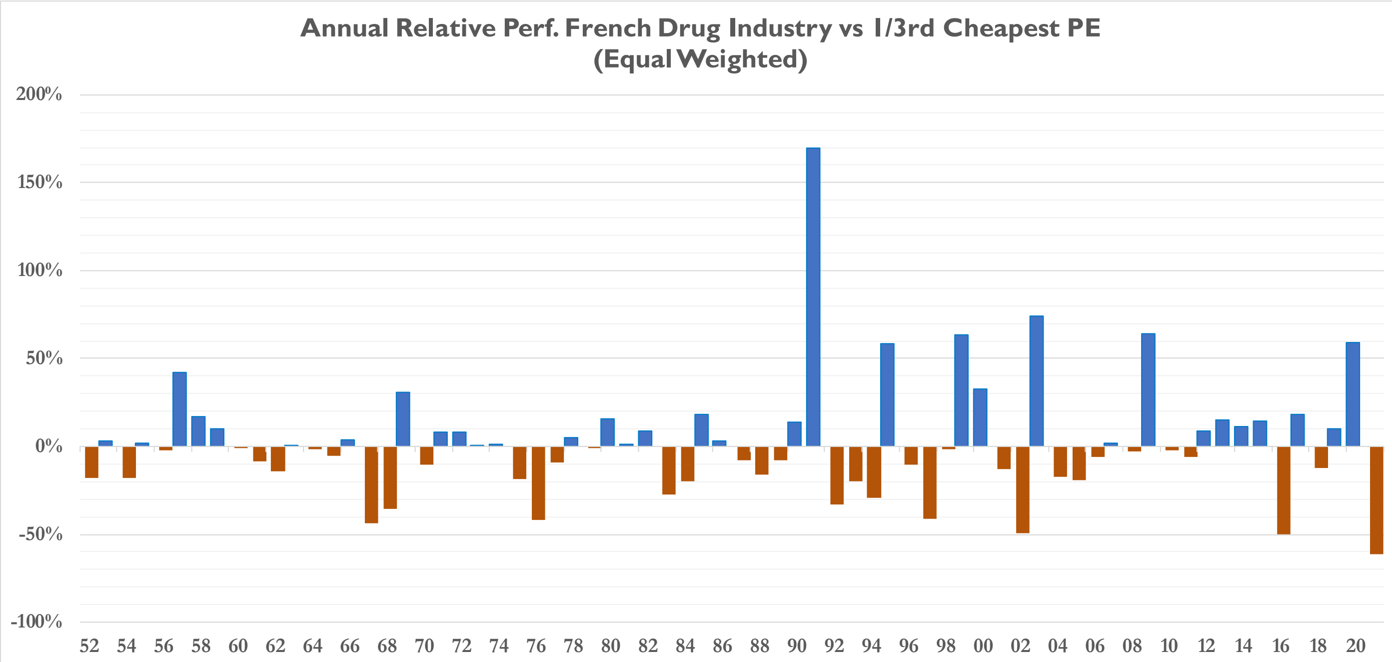
Comparison of $POS_{1,APP}$ on various subsets of the data

	All data (%)	2006-2015 (%)	ClinicalTrials.gov only (%)
Oncology	3.4	2.9	2.6
Metabolic/ Endocrinology	19.6	17.5	19.2
Cardiovascular	25.5	23.8	26.6
CNS	15.0	13.6	15.1
Autoimmune/ Inflammation	15.1	13.9	14.6
Genitourinary	21.6	21.0	24.4
Infectious Disease	25.2	25.6	27.2
Ophthalmology	32.6	31.3	34.8
Vaccines (Infectious Disease)	33.4	34.8	35.5
Overall	13.8	13.2	13.4

Source: Chi Heem Wong, Kien Wei Shah, Andrew W Lo. "Estimation of clinical trial success rates and related parameters." Biostatistics 20(2): April 2019, Pages 273-286.

Despite the improbable odds of achieving approval, the binary dynamic of pharma and biotech stocks can lead to periods of outsize returns for the group in aggregate given the premiums paid on a takeout or FDA approval. In Exhibit 7 (on the next page) we examine the French database and illustrate the annual relative performance of the Drugs industry vs the cheapest 1/3rd price-to-earnings bucket (a barometer for value). Since 1990, the potential for large relative returns has increased.

Exhibit 7



Sources: Kenneth French & Foundry Partners LLC

When we breakdown the relative performance into periods we find that the past decade (2010 to 2020) provided the best chance to outperform the value index. This period coincided with extremely accomodative stimulus and low interest rates. While the 1990 to 2009 period exhibited massive severity when pharma/biotech worked but lower odds of outperformance (40%).

Exhibit 8

Equal Weighted	Years Outperf	Years Underperf	% of Outperf	Avg Outperf	Avg Underperf
1951 to 1989	18	20	47%	10%	-15%
1990 to 2009	8	12	40%	60%	-20%
2010 to 2020	7	4	64%	20%	-18%
2021	0	1	0%	NA	-61%
Total	**33**	**37**	**47%**	**24%**	**-18%**

Sources: Kenneth French & Foundry Partners LLC

The flaw with examining pharma/biotech with an equal weighted index as we have done above is that it fails to account for the positive skewness of the group (see discussion on the next page). If we use the value weighted indices (market cap-weighted) provided by the French database as illustrated in Exhibit 9, we see a more muted upside.

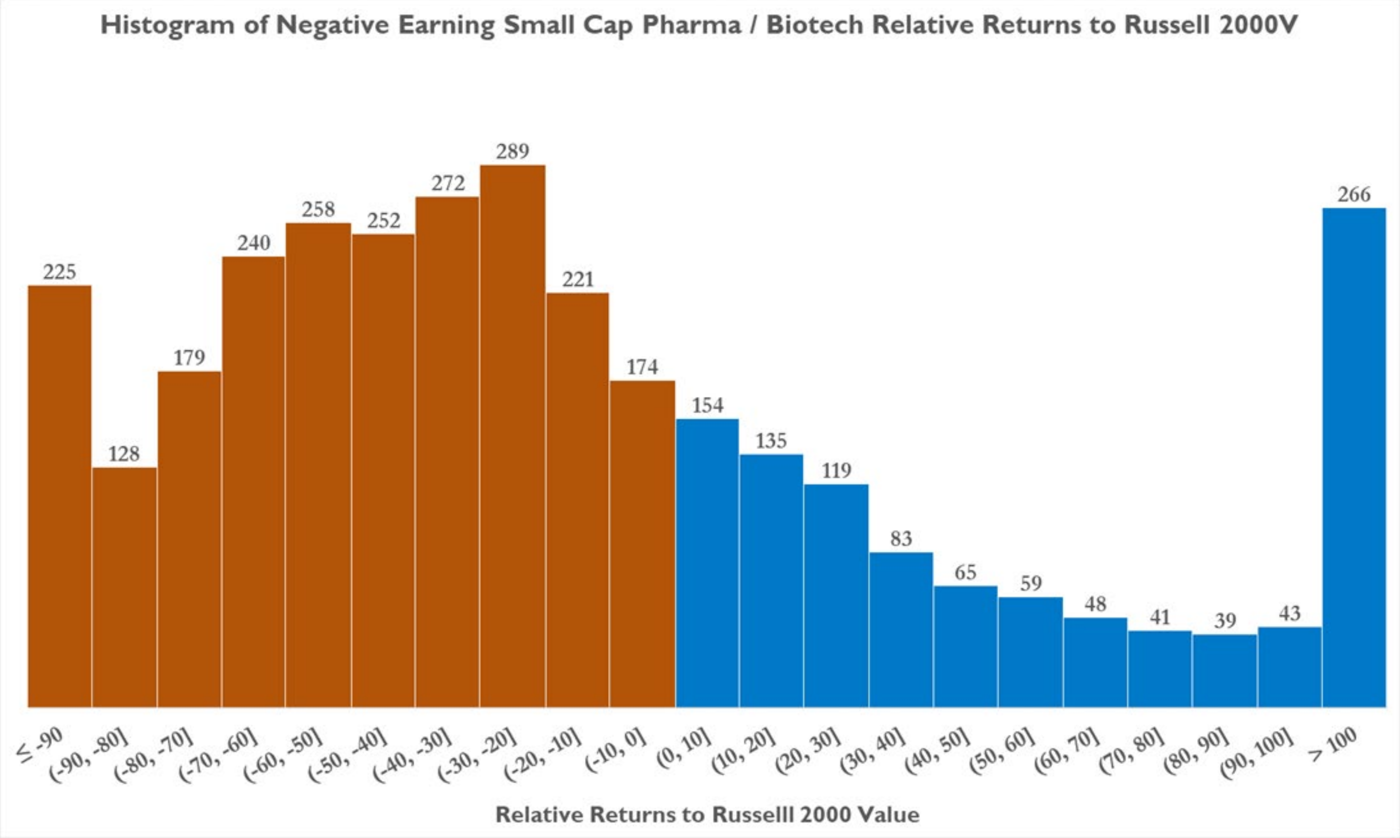
Exhibit 9

Value Weighted	Years Outperf	Years Underperf	% of Outperf	Avg Outperf	Avg Underperf
1951 to 1959	19	19	50%	12%	-20%
1990 to 2009	9	11	45%	18%	-16%
2010 to 2020	7	4	64%	10%	-12%
2021	0	1	0%	NA	-16%
Total	**35**	**35**	**50%**	**13%**	**-18%**

Sources: Kenneth French & Foundry Partners LLC

In Exhibits 10 and 12, we created histograms utilizing our small cap database that goes back to 2001 to examine the distribution of negative and positive pharma/biotech stocks[5]. While we recognize the shortfalls of examining such a short period, it does give insight to how the underlying companies performed over a robust performance period for the group. Out of roughly 3,300 negative earning pharma/biotech observations, 68% underperform the Russell 2000 Value benchmark. It is the positive skewness and fat tails of positive returns (8% outperform by 100% or more) that make it so alluring and create such outsize returns in the aggregate performance despite the risk required (7% underperform by 90% or more).

Exhibit 10

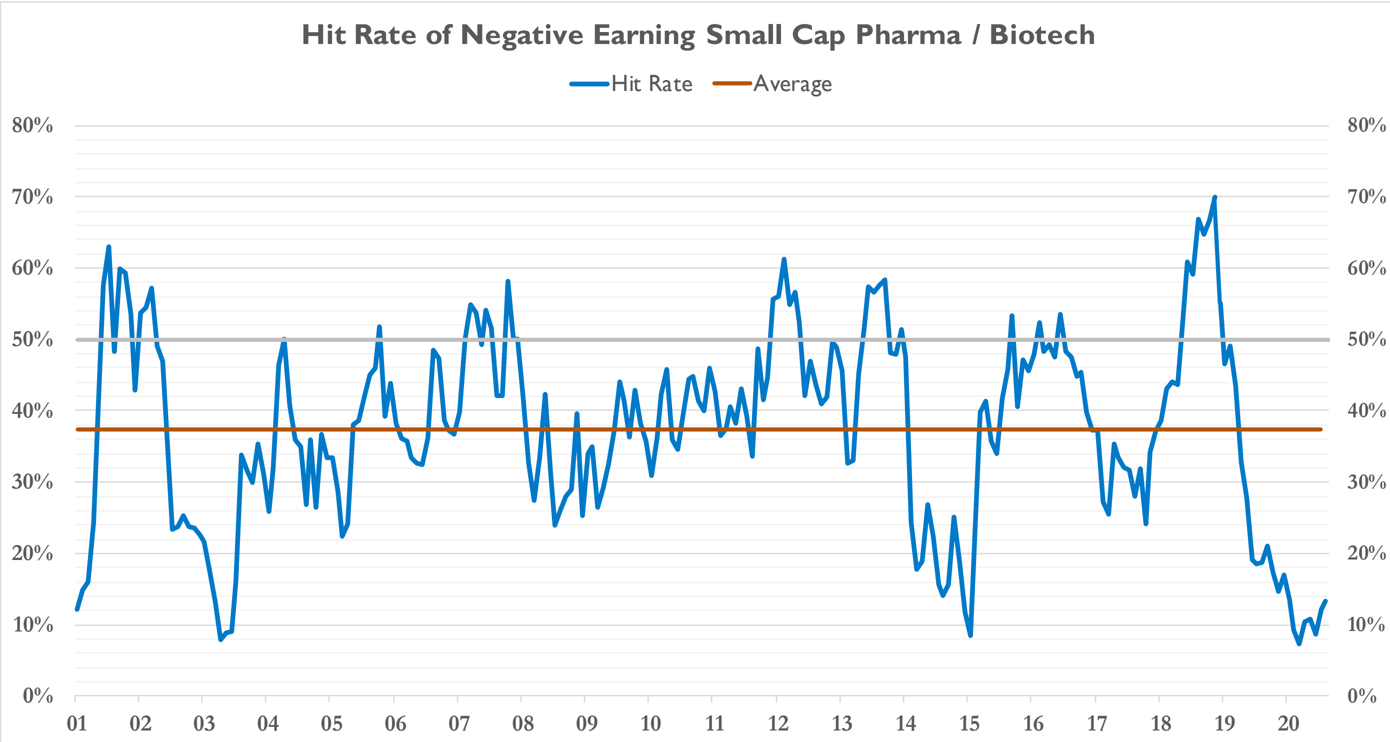


Sources: FactSet & Foundry Partners LLC

[5]Performance is based on the next-twelve-month relative returns of all negative earning pharma/biotech names that are $80M to $6B in market cap on an annual basis (December year-end). We break the space up into negative earners and positive earners based upon next twelve-month earnings where available and trailing twelve-month earnings if there are no analyst estimates.

To view it another way, we can examine the number of negative earning small cap pharma/biotech stocks that outperformed the Russell 2000 Value over a next twelve-month performance period. We call this percentage the hit rate. As illustrated in Exhibit 11, there have been few times where 50% or more of the names within the group consistently outperformed the benchmark. The average is 38% over this period. Not compelling odds.

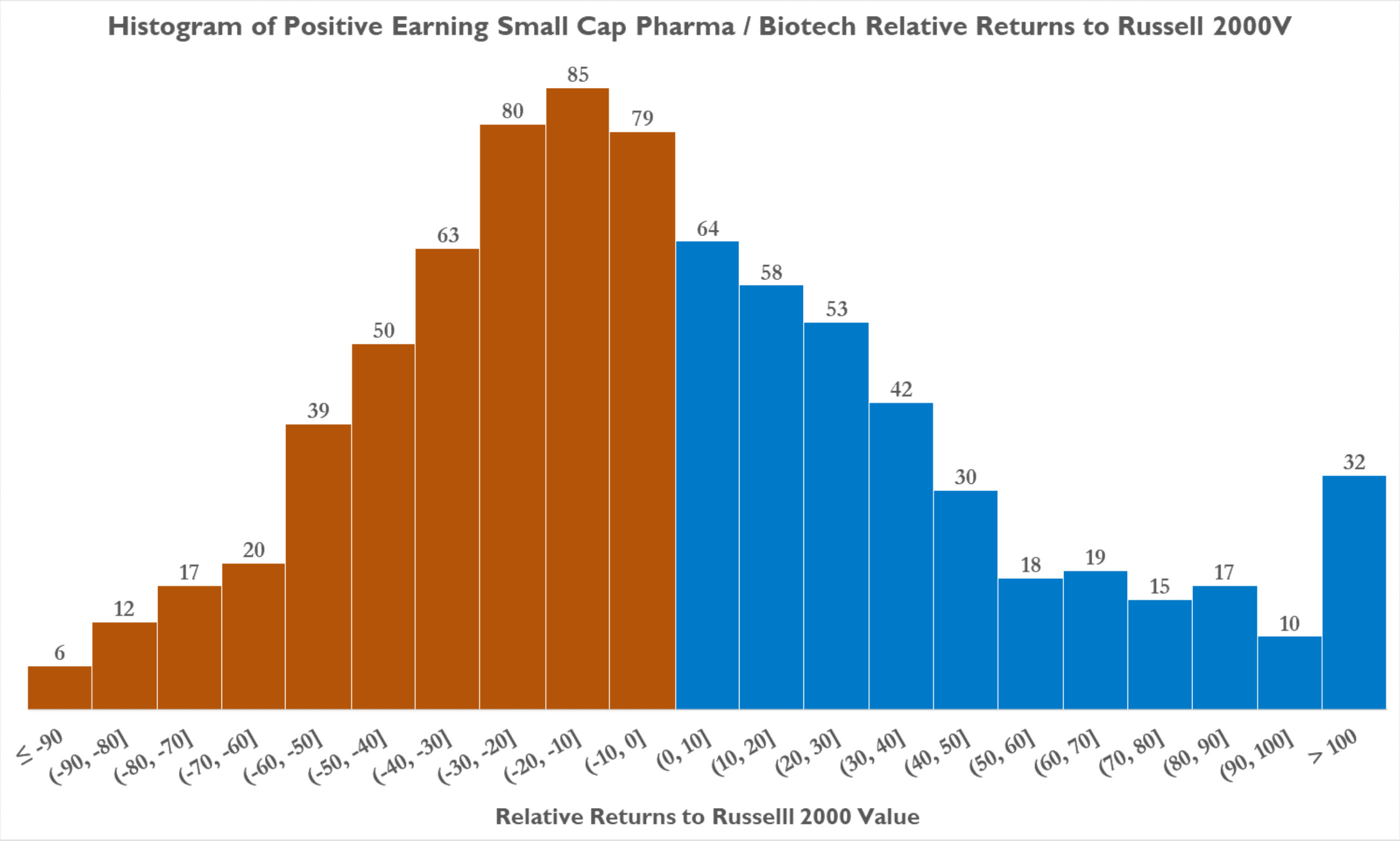
Exhibit 11



Sources: FactSet & Foundry Partners LLC

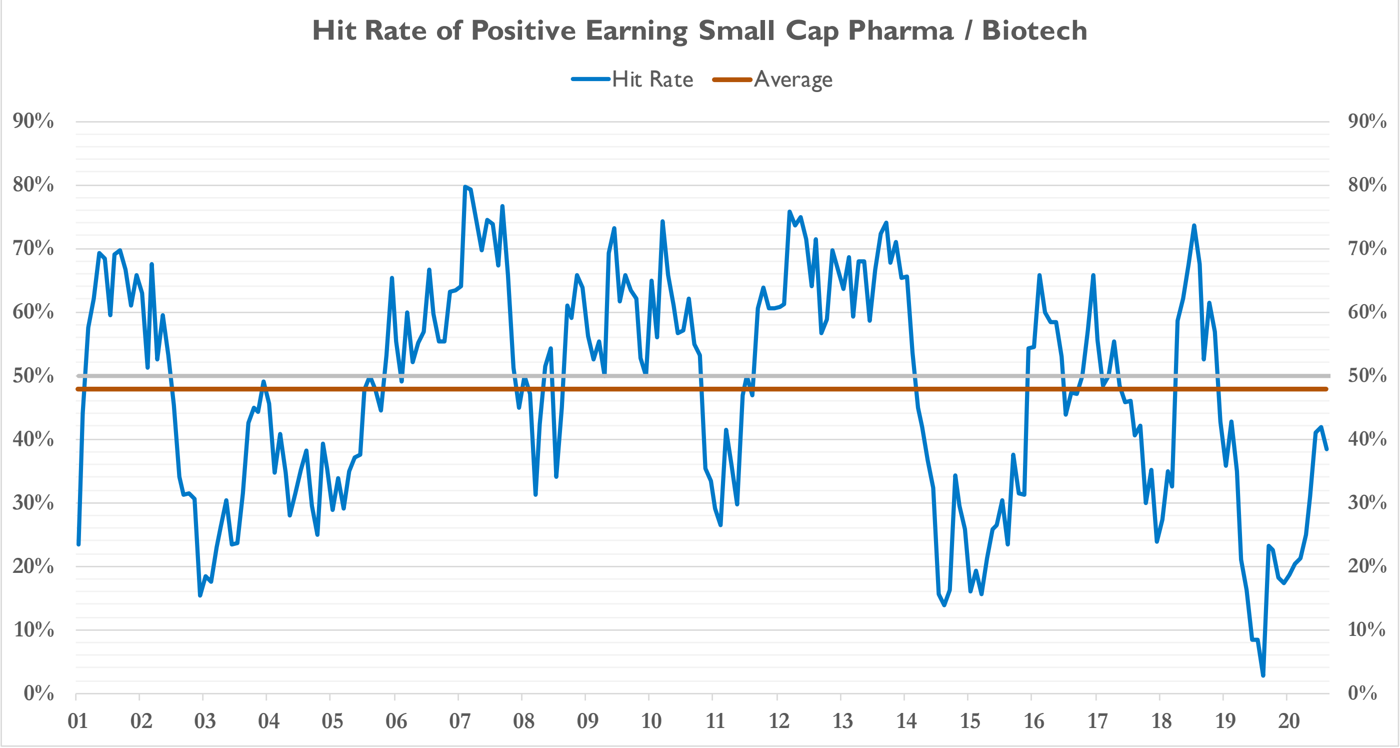
Pharma/biotech stocks with positive earnings exhibit a better chance of picking winners (44% beat the index over the next-twelve-months vs 32% for negative earners) and a more normalized distribution with less amplified tails. These stocks also provide a better hit rate (48% over time) and a better chance of avoiding a complete loss (1% underperform by 90% or more). We believe this provides a more fertile ground for value managers with less risk of complete loss. See Exhibits 12 & 13 on the following page.

Exhibit 12



Sources: FactSet & Foundry Partners LLC;

Exhibit 13



Sources: FactSet & Foundry Partners LLC

Value managers tend to rely on various traditional fundamental metrics when it comes to analyzing stocks. Despite the outsized pharma/biotech weightings of the benchmark, most of the companies within the small cap pharma/biotech space are difficult to analyze given their lack of earnings. As we have illustrated above, the chance of catching a period of pharma/biotech outperformance is a coin toss and the odds of selecting the winners amongst the negative earners is far worse.

What is a value manager to do with such high active risk due to the benchmark's allocation? In our opinion there are the following choices assuming we avoid negative earning companies:

1. Avoid the space entirely or, attempt some form of analysis with the profitable names but nonetheless remain underweight negative earners accepting the risk

2. Benchmark weight, neutralizing the impact by owning all the stocks in the index or an ETF with high correlation to capture severity

As behaviorists we are reminded of the Prisoner's Dilemma. A well-known game theory where two criminals both convicted of the same crime are placed into separate rooms, with no means of communication and asked to betray each other in exchange for receiving a reduced sentence. The highest payoff for both is cooperation (staying silent) but the allure of complete freedom by defecting (betraying your accomplice) places the cooperative choice in doubt. See payoff structure in Exhibit 14.

Exhibit 14

Prisoner's Dilemma		Prisoner B	
		Stays silent (cooperates)	Betrays (defects)
Prisoner A	Stays silent (cooperates)	Each serves 1 year	Prisoner A: 3 years Prisoner B: goes free
	Betrays (defects)	Prisoner A: goes free Prisoner B: 3 years	Each serves 2 years

As value managers we find ourselves in a similar dilemma given the weights in the value indices and the long-duration like characteristics of the industry combined with the binary nature of outcomes. We call it the Pharma/Biotech Dilemma. Instead of Prisoner A and Prisoner B, we have Mr/Mrs Value and Mr/Mrs Benchmark. While the payouts differ, it does provide realistic outcome paths. If Mr/Mrs Value remain true to their value stripes and pharma/biotech underperforms, then the alpha contribution is massive depending on level of active risk. If pharma/biotech outperforms (especially during periods when long-duration assets catch a tailwind), then the drag on alpha is considerable depending on level of active risk.

Exhibit 15

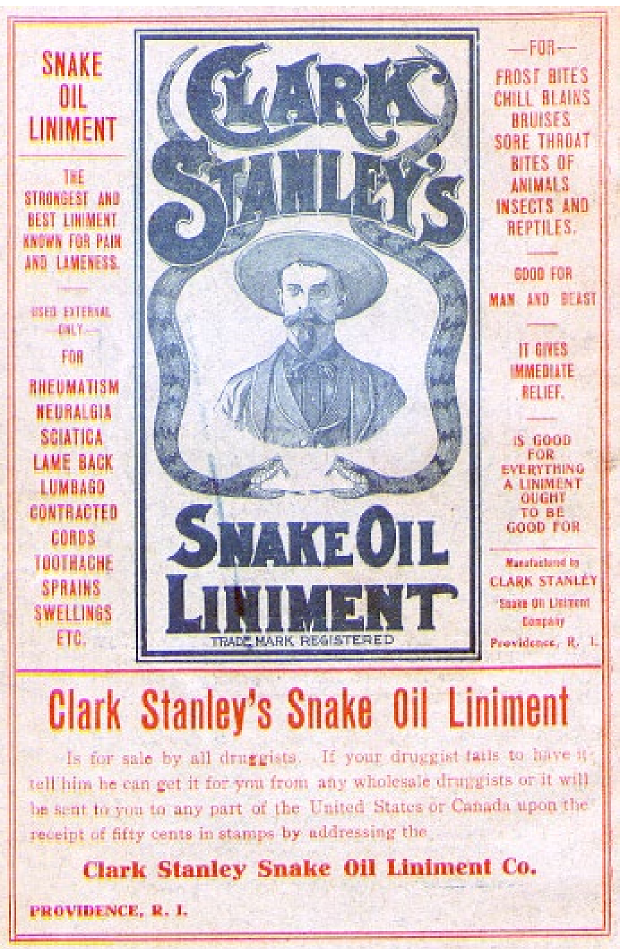
Pharma/Biotech Dilemma		Mr/Mrs Benchmark	
		Pharma Underperforms	Pharma Outperforms
Mr/Mrs Value	Portfolio Underweight	Mr/Mrs V Outperforms	Mr/Mrs V Underpeforms
	Portfolio Equalweigt	Mr/Mrs V Neutral	Mr/Mrs V Neutral

Active Risk	# of Names
High	Stays the Same
Low	Increases 100+

Alternatively, Mr/Mrs Value could equal weight the exposure with one caveat – own all stocks. This path will certainly neutralize the risk but require the addition of more names and negative-earning/long-duration stocks to the portfolio which runs counter to a value manager's core beliefs. Which reminds us of a story.

At the 1893 World's Columbian Expedition in Chicago, a man known as the Rattlesnake King from Texas mesmerized audiences by slitting open a live rattlesnake, tossing it into boiling water, collecting the fat that rose to the top and selling it to wide-eyed attendants for $0.50 a bottle. His name was Clark Stanley, and he got the idea from Chinese immigrants who used an oil derived from Chinese water snakes to help reduce inflammation after long days of working on the transcontinental railroad. Never mind that Chinese water snakes were not easily found in the United States or that rattlesnake oil was less effective or that years later, in 1917, a federal investigation found that Stanley's Snake Oil had in fact no snake oil at all[6]. The showman dressed up the idea and the idea sold itself.

While snake oil failed to live up to its hype, it coincided with some major breakthroughs in pharmacology and regulation for the industry that changed the course of humanity. There is no question that medical advancements throughout the century have improved the quality of life and extended life expectancy for humans. That said, not all the companies within the pharma/biotech space will change the course of humanity, most will go the way of dear ol'Stanley's Snake Oil while a few will be revolutionary. You either must own them all or just be lucky enough to own the game changers to capture alpha. Until the winners have been established and/or the Russell benchmarks rebalance to a lower weighting, most value managers will be faced with their own Pharma/Biotech Dilemma.



Source:
https://commons.wikimedia.org/wiki/File:Clark_Stanley%27s_Snake_Oil_Liniment.png

After swallowing the red pill and taking a trip down the rabbit hole, we walk away with the following:

1. The number of stocks in the Pharma/Biotech space has grown considerably over the past decade with a majority unprofitable and concentrated at the lower end of the market cap-spectrum.

2. The binary nature and low probability of success of the industry creates significant outliers to returns lending to a positive skewness and fat tails in the distribution of relative performance, especially for negative earners.

3. There is a 50% chance of catching a period of outperformance for the group while low hit rates among negative earners require owning all names in the benchmark to fully mitigate the active risk of being underweight these negative earners.

[6]https://en.wikipedia.org/wiki/File:SnakeOilDecision.jpg

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Mark Roach is the Lead Portfolio Manager on the Fundamental Small Cap Value team for Foundry Partners. Mark started in the industry in 1995 and has been with Foundry Partners since the company's transaction with Dreman Value Management (DVM) in June of 2016. He was with DVM from late 2006-June 20, 2016 in a similar capacity. Prior to joining DVM, Mr. Roach was a Portfolio Manager at Vaughan Nelson Investment Management, managing a small cap product from 2002 through 2006. Mr. Roach has significant experience in working with institutions, pensions and endowments and is well known in the consulting and high net worth community. Mr. Roach served as a security analyst from 1994 to 2001 for various institutions including Fifth Third Bank, Lynch, Jones & Ryan and USAA.

Mr. Roach graduated from Baldwin Wallace College with a B.A. in Business, and earned a MBA from the University of Chicago's Booth School of Business. In addition, Mr. Roach is a former board member on the Rice University Wright Fund.

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About Foundry Partners:

Foundry Partners, LLC, is a boutique asset management company that specializes in active management. Established in September of 2012, the company officially began managing assets in February 2013. The firm originated after its founders, former Fifth Third Asset Management Employees, acquired the growth and value products/assets from Fifth Third Asset Management, Inc. As part of Foundry's long term plan to grow both organically and strategic acquisition, Foundry Partners added to its Cleveland office with the acquisition of the Small and Mid-Cap Value team (and assets) from Dreman Value Management. This was followed by acquiring growth manager, Arbor Capital Management in Minneapolis. As part of each transaction, the accompanying portfolio management teams transitioned over to Foundry Partners.

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