US Small Caps : Smoke and Mirrors.

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The aim of this quick study is to check whether the well-known outperformance of US Small Caps over US Large Caps :

- Is true
- Is persistent with respect to market timing
- Is persistent with respect to internal selectivity within the index

This study relies on two indices :

- S&P 500 Total Return
- Russell 2000 Total Return

The horizon we choose lays between 1998, December 31st and 2015, December 22nd.

Persistent with Market Timing ?

We can notice that an investor who check its performance at each end of year, and who had kept its equity position until 2015, December, 22nd, would have notice outperformance of S&P 500 versus Russell 2000 should he had invested at the end of 2004, 2005 , 2006, 2007 …. 2014. This outperformance lies between 1.7% (investment at the end of 2007) and 24.9% (investment at the end of 2010).

Therefore the post 2008 rally in equities was clearly driven by large caps (here through S&P 500) over small caps (here through Russell 2000).

We can notice that on the table herebelow, the outperformance of large caps can be exhibited on the bottom right, whereas everywhere else in the table, and whatever the holding period, Russell 2000 was used to post better performance than S&P 500.

The only period at which we noticed the same outperformance behaviour of S&P 500 was during the equity krach in 2007 – 2008, large caps being considered as safer than small ones : in this case it was clearly a defensive reaction.

The rally that followed enables the US Equity market to rise by 162.3% for S&P 500 since 2008, Dec 31st, and by 150.5% for Russell 2000 since 2008, Dec 31st. Please note that between, 2010, Dec 31st and 2015, Dec 22nd , S&P 500 posted a performance of 80.2% whereas Russell 2000 posted 'only' 55.3%.

There is one explanation : the market has changed, with the increase of ETF investing, smart-beta strategies and systematic strategies.

Performance of S&P 500 Total Return – Russell 2000 Total Return

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1999	-0.2%	-5.5%	-23.6%	-20.3%	-43.9%	-59.2%	-62.5%	-75.8%	-67.3%	-47.7%	-61.3%	-90.7%	-78.9%	-92.3%	-137.8%	-127.0%	-109.2%
2000		-4.4%	-19.3%	-16.6%	-36.1%	-48.7%	-51.4%	-62.3%	-55.3%	-39.2%	-50.4%	-74.6%	-64.9%	-75.9%	-113.3%	-104.4%	-89.8%
2001			-16.5%	-14.6%	-34.6%	-47.7%	-50.3%	-61.4%	-53.5%	-38.4%	-49.4%	-74.8%	-64.2%	-75.1%	-113.3%	-102.6%	-86.6%
2002				-1.6%	-16.8%	-27.4%	-28.7%	-36.5%	-28.4%	-22.0%	-28.6%	-49.7%	-39.4%	-46.3%	-74.2%	-59.9%	-44.6%
2003					-18.6%	-31.6%	-33.0%	-42.4%	-32.0%	-25.3%	-33.0%	-59.1%	-46.1%	-54.2%	-88.0%	-69.2%	-50.0%
2004						-7.4%	-7.5%	-11.8%	-4.1%	-5.9%	-8.2%	-23.7%	-14.5%	-17.4%	-34.0%	-17.7%	-4.3%
2005							**0.4%**	-2.4%	**4.5%**	**0.1%**	-0.5%	-12.6%	-4.7%	-5.9%	-17.2%	-1.8%	**9.7%**
2006								-2.7%	**3.8%**	-0.2%	-0.8%	-12.3%	-4.9%	-6.0%	-16.8%	-2.4%	**8.4%**
2007									**5.6%**	**1.3%**	**1.2%**	-8.4%	-1.9%	-2.6%	-11.0%	**1.9%**	**11.2%**
2008										-2.3%	-3.4%	-13.8%	-7.4%	-8.9%	-19.5%	-7.6%	**1.7%**
2009											-0.7%	-15.8%	-6.0%	-7.5%	-21.5%	-2.5%	**11.7%**
2010												-11.8%	-4.1%	-5.1%	-15.9%	-0.8%	**10.4%**
2011													**6.3%**	**7.0%**	**2.0%**	**15.9%**	**24.9%**
2012														-0.3%	-7.9%	**5.2%**	**14.4%**
2013															-6.4%	**4.9%**	**12.9%**
2014																**8.8%**	**14.6%**
2015																	**5.4%**

The « 15.9% » stands for the difference between S&P 500 Total Return – Russell 2000 Total Return, and between 2010, December 31st and 2014, December 22nd.

Looking at that table, we can notice that until 2010, Russell 2000 used to outperform regularly S&P 500, except in 2007-2008, where the washoff was much more harsh for small caps than for large caps. It seems that since 2010, investors' behaviour has changed with a big shift towards ETFs and smart-beta, risk premia solutions, focusing on large caps and low-volatility assets (Minimum Variance method, Equal Risk Contribution)

Persistent with Internal Selectivity Within the Index – Acturial and Total Return

We check the composition of each index at the last day of year Y-1, and assume the composition remains stable over year Y. Given the huge rotation of US indices, it is a way to minimize the error due to index reshuffle and birth and death sample bias.

1999	Russell 2000	S&P 500
Mean	25.6%	12.1%
Median	-7.4%	-0.6%
>Index Performance	27.5%	30.0%
Index Performance	21.3%	21.0%
% of sample with perf. <-50%	10.4%	2.8%
% of sample with perf. >100%	12.3%	6.5%

2000	Russell 2000	S&P 500
Mean	2.6%	9.4%
Median	-3.7%	8.7%
>Index Performance	46.3%	61.9%
Index Performance	-3.0%	-9.1%
% of sample with perf. <-50%	23.2%	8.8%
% of sample with perf. >100%	7.8%	3.9%

2001	Russell 2000	S&P 500
Mean	12.4%	-0.4%
Median	5.5%	-1.8%
>Index Performance	42.5%	66.5%
Index Performance	2.5%	-11.9%
% of sample with perf. <-50%	13.1%	7.1%
% of sample with perf. >100%	6.8%	2.1%

2002	Russell 2000	S&P 500
Mean	-19.8%	-17.7%
Median	-17.2%	-14.9%
>Index Performance	52.7%	61.1%
Index Performance	-20.5%	-22.1%
% of sample with perf. <-50%	26.4%	16.0%
% of sample with perf. >100%	0.6%	0.0%

2003	Russell 2000	S&P 500
Mean	61.2%	42.0%
Median	41.0%	32.1%
>Index Performance	33.7%	55.2%
Index Performance	47.3%	28.7%
% of sample with perf. <-50%	0.9%	0.0%
% of sample with perf. >100%	18.0%	7.1%

2004	Russell 2000	S&P 500
Mean	16.9%	16.6%
Median	14.1%	14.6%
>Index Performance	44.7%	57.1%
Index Performance	18.3%	10.9%
% of sample with perf. <-50%	2.6%	0.2%
% of sample with perf. >100%	3.7%	0.6%

2005	Russell 2000	S&P 500
Mean	3.5%	8.8%
Median	-0.9%	5.1%
>Index Performance	42.0%	50.5%
Index Performance	4.5%	4.9%
% of sample with perf. <-50%	6.4%	0.4%
% of sample with perf. >100%	2.3%	0.8%

2006	Russell 2000	S&P 500
Mean	16.1%	16.1%
Median	13.4%	15.6%
>Index Performance	42.6%	49.4%
Index Performance	18.3%	15.8%
% of sample with perf. <-50%	3.1%	0.0%
% of sample with perf. >100%	3.1%	0.4%

2007	Russell 2000	S&P 500
Mean	-5.9%	2.5%
Median	-13.3%	1.6%
>Index Performance	36.1%	43.2%
Index Performance	-1.6%	5.6%
% of sample with perf. <-50%	11.6%	4.7%
% of sample with perf. >100%	3.0%	1.6%

2008	Russell 2000	S&P 500
Mean	-38.8%	-39.3%
Median	-44.2%	-38.1%
>Index Performance	40.3%	47.8%
Index Performance	-33.8%	-37.0%
% of sample with perf. <-50%	43.6%	33.7%
% of sample with perf. >100%	0.2%	0.0%

2009	Russell 2000	S&P 500
Mean	50.1%	45.1%
Median	23.8%	33.7%
>Index Performance	47.1%	59.4%
Index Performance	27.1%	26.4%
% of sample with perf. <-50%	4.5%	0.6%
% of sample with perf. >100%	16.1%	10.6%

2010	Russell 2000	S&P 500
Mean	26.9%	21.2%
Median	20.3%	19.3%
>Index Performance	43.1%	56.6%
Index Performance	26.8%	15.1%
% of sample with perf. <-50%	2.7%	0.2%
% of sample with perf. >100%	6.9%	0.2%

2011	Russell 2000	S&P 500
Mean	-7.0%	0.5%
Median	-7.9%	5.0%
>Index Performance	44.1%	46.7%
Index Performance	-4.2%	2.1%
% of sample with perf. <-50%	11.3%	2.5%
% of sample with perf. >100%	0.9%	0.2%

2012	Russell 2000	S&P 500
Mean	16.9%	16.9%
Median	13.5%	14.9%
>Index Performance	45.4%	47.0%
Index Performance	16.4%	16.0%
% of sample with perf. <-50%	4.2%	0.8%
% of sample with perf. >100%	3.9%	1.0%

2013	Russell 2000	S&P 500
Mean	43.4%	36.9%
Median	34.3%	34.5%
>Index Performance	45.1%	51.6%
Index Performance	38.8%	32.4%
% of sample with perf. <-50%	1.9%	0.2%
% of sample with perf. >100%	11.1%	3.1%

2014	Russell 2000	S&P 500
Mean	3.4%	14.0%
Median	1.7%	14.7%
>Index Performance	45.1%	51.8%
Index Performance	4.9%	13.7%
% of sample with perf. <-50%	6.9%	0.6%
% of sample with perf. >100%	1.8%	0.4%

2015 (as of Nov. 11th)	Russell 2000	S&P 500
Mean	-4.3%	-0.6%
Median	-4.9%	-0.5%
>Index Performance	44.7%	43.4%
Index Performance	-1.1%	2.6%
% of sample with perf. <-50%	10.7%	2.9%
% of sample with perf. >100%	1.8%	0.4%

Look at the 1999 table. The Russell 2000 posted a 21.3% performance, with an average performance of the components of 25.6%. The median is -7.6% !!!, almost 30 points below.

Except in 2002, the median performance of the Russell 2000 components is always below the average performance, or the performance of the Index.

Two explanations :

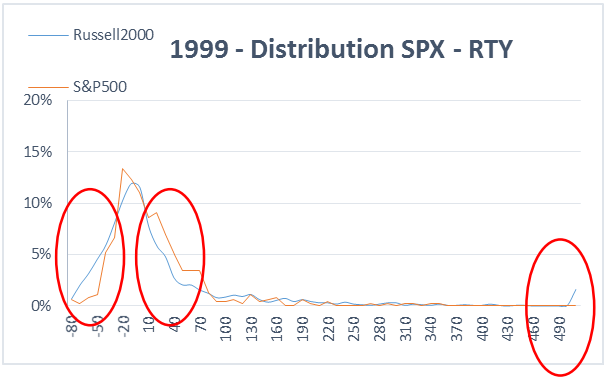
- The median performance of the components is lower than the average performance

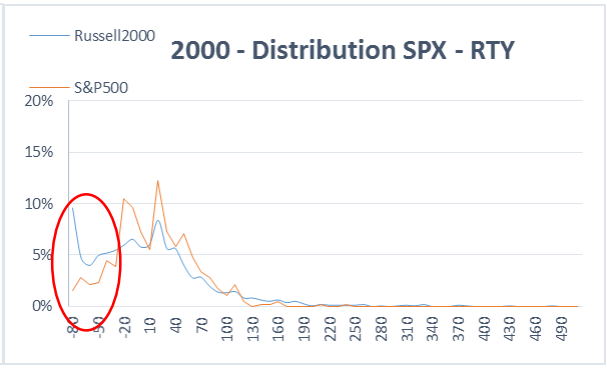
➔ The distribution exhibits excessively large returns on the positive side, dramatically shifting the average return on the upside.

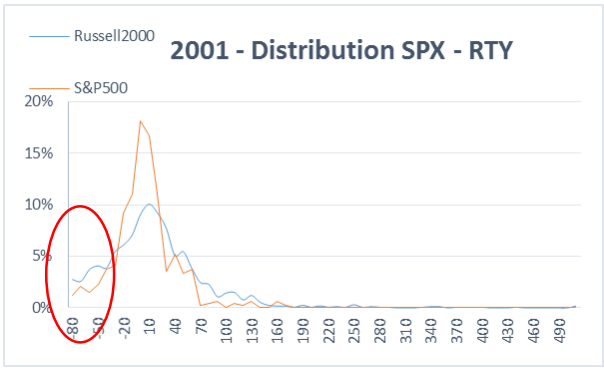
- The average performance of the components is lower than the index performance.

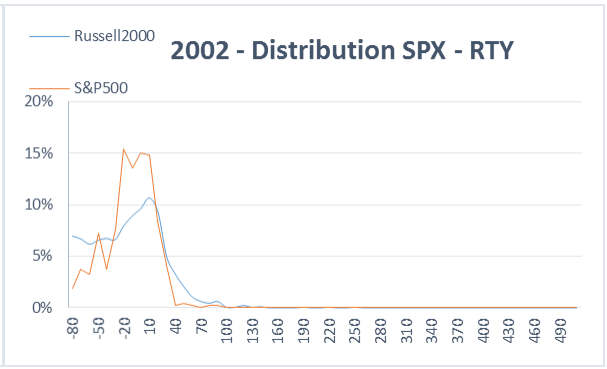
➔ These indices, being capitalization-weighted, give more weight to large capitalizations. Therefore, large capitalizations tend to outperform small, even within the Russell 2000 Index.

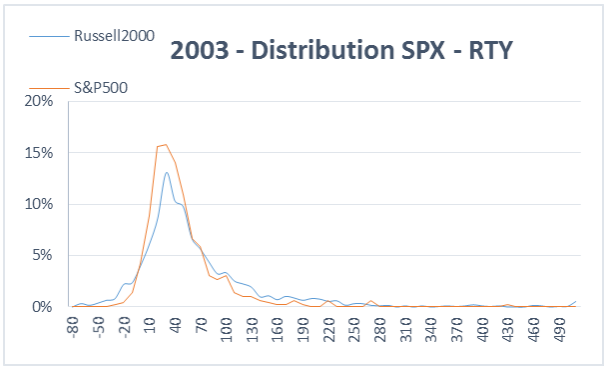
Herebelow is the distribution of the annual performances of the components from S&P500 and Russell2000.

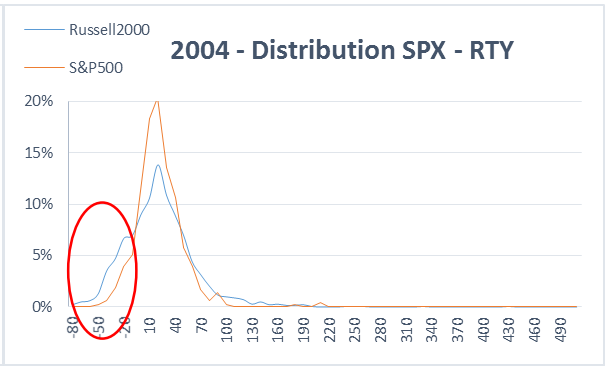


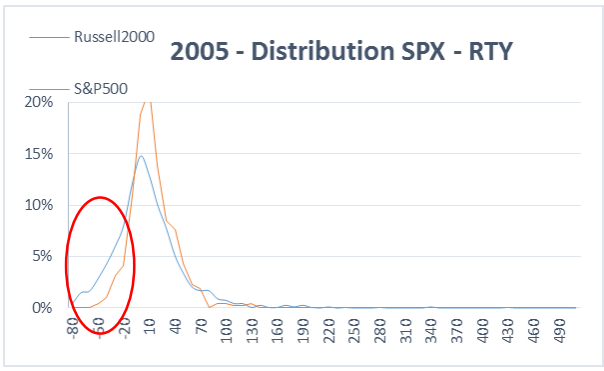


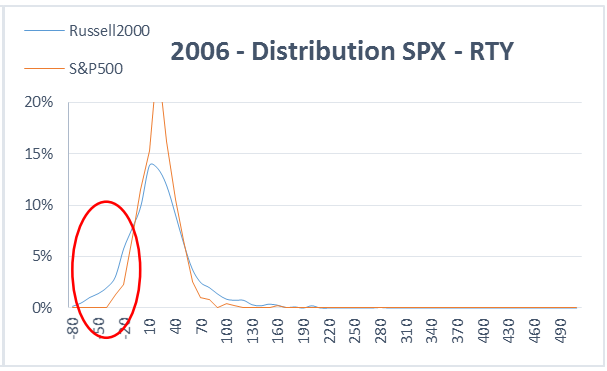


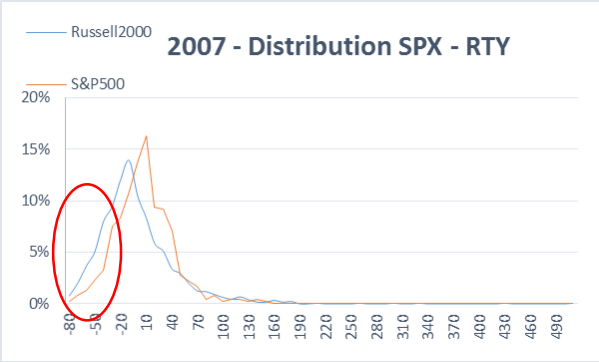











2007 - Distribution SPX - RTY
Russell2000
S&P500
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10%
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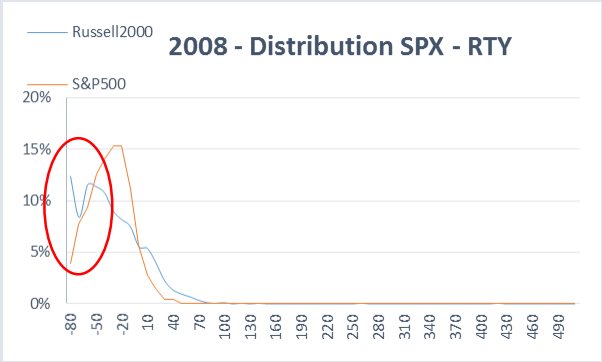
-80 -50 -20 10 40 70 100 130 160 190 220 250 280 310 340 370 400 430 460 490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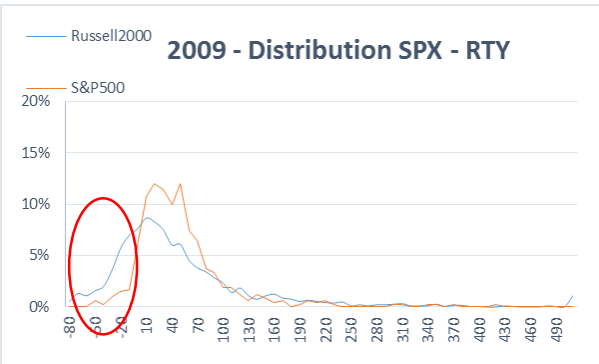
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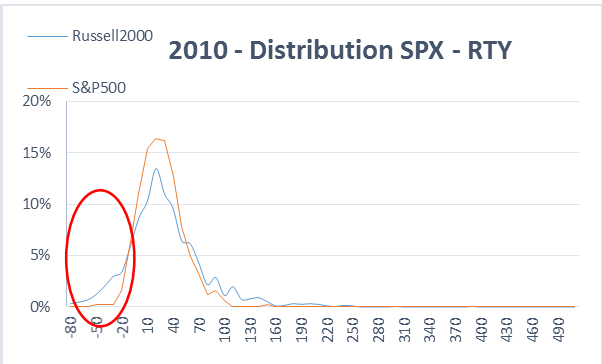
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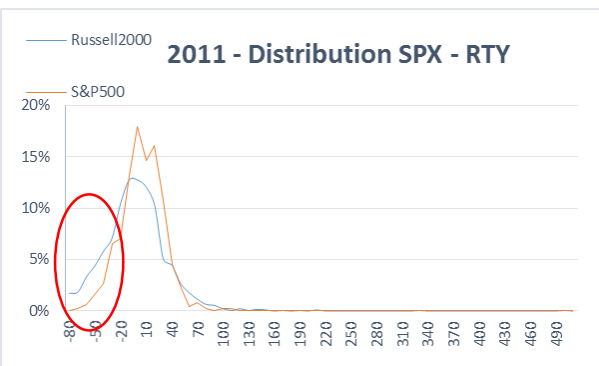
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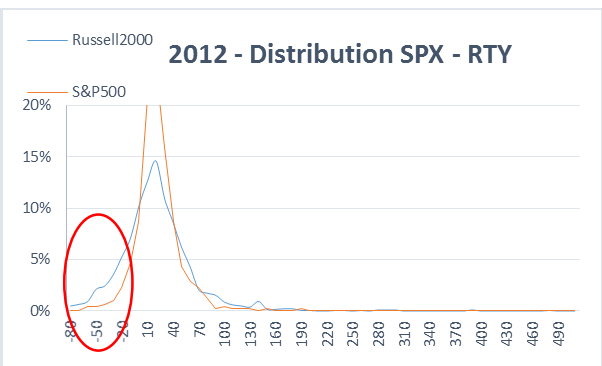
2012 - Distribution SPX - RTY
Russell2000
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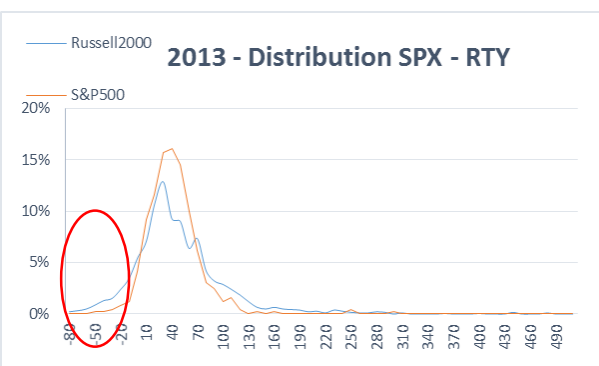
2013 - Distribution SPX - RTY
Russell2000
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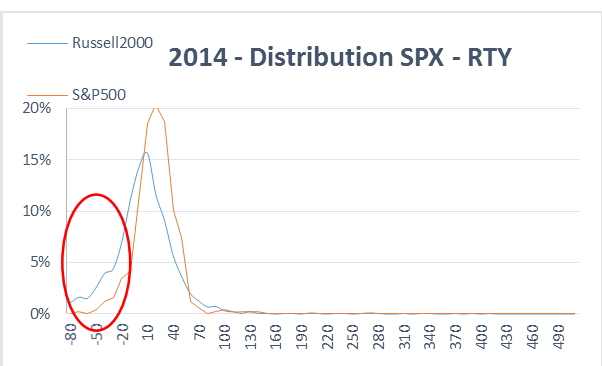
2014 - Distribution SPX - RTY
Russell2000
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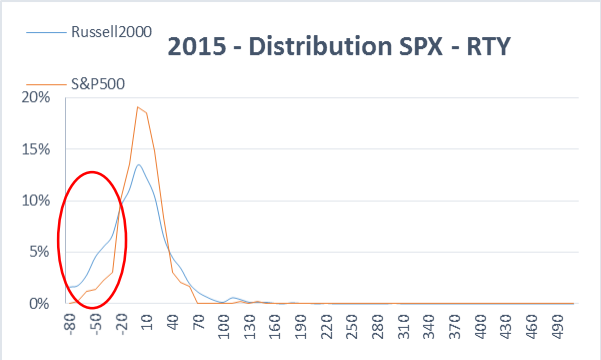
-80 -50 -20 10 40 70 100 130 160 190 220 250 280 310 340 370 400 430 460 490



These distributions are very interesting, looking at the extreme left wing, the right hand part of the body and the extremes upper side of the distribution.

Without any surprise, tails are a lot thicker for Russell 2000 than for S&P 500. Moreover, on Russell 2000, best annual performances exceed 1000%. Question is :

Given the well–known investor asymetry between gain and loss, do you think that a stock which is up 100% will be kept in the portfolio by the asset manager. Don’t you think very likely that he will cut the position in order to « take his profit »…Therefore, in a stock-picker paradigm, and given the behavioral and cognitive bias, it can be considered as very difficult to keep a large (>100%) winning position. Thus, the contribution of positive extremes to the Russell 2000 cannot be taken into account in a stock-picking framework. Using medians in order to measure each stock performance seems then a much more reasonable assumption (cf below).

Performance of S&P 500 Total Return – Russell 2000 Total Return, calculating using the median of the return of the components, year after year. These returns are capitalized over time.

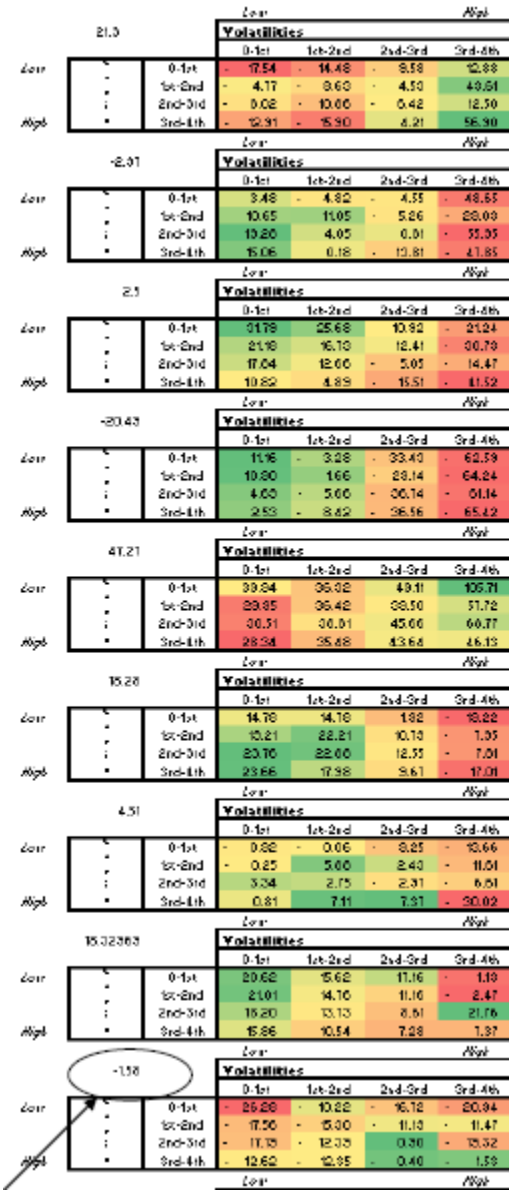
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1999	28.4%	17.8%	2.9%	-2.4%	-12.7%	-17.6%	-9.3%	-10.1%	14.0%	18.9%	25.7%	25.1%	35.8%	43.9%	56.1%	80.8%	90.4%
2000		-8.0%	-21.5%	-21.7%	-38.3%	-46.3%	-39.2%	-44.0%	-19.4%	-1.7%	-0.2%	-5.0%	5.9%	9.3%	10.2%	30.0%	39.7%
2001			-14.8%	-16.7%	-32.3%	-39.8%	-31.8%	-35.6%	-9.6%	5.0%	8.3%	4.6%	16.1%	21.3%	25.9%	48.6%	58.9%
2002				-4.9%	-16.5%	-22.1%	-13.5%	-14.8%	10.6%	17.3%	23.8%	22.7%	34.0%	41.9%	53.4%	78.8%	88.9%
2003					-12.3%	-18.2%	-7.3%	-7.6%	23.5%	27.7%	37.4%	37.4%	51.2%	62.4%	80.0%	112.9%	125.3%
2004						-3.2%	5.2%	6.3%	28.9%	27.5%	36.4%	37.9%	47.9%	57.7%	74.6%	100.4%	109.4%
2005							7.5%	9.0%	28.9%	26.4%	34.8%	36.5%	45.4%	54.5%	70.6%	93.9%	101.8%
2006								0.4%	20.2%	20.9%	27.8%	28.5%	37.3%	45.1%	58.1%	79.8%	87.7%
2007									17.4%	18.2%	24.2%	24.8%	32.5%	39.4%	50.7%	69.7%	76.7%
2008										8.1%	11.7%	9.9%	18.4%	23.3%	29.2%	47.2%	54.8%
2009											2.7%	-3.4%	11.4%	16.7%	19.1%	46.8%	60.1%
2010												-5.2%	6.7%	10.5%	11.6%	33.4%	44.1%
2011													10.0%	13.9%	16.4%	35.5%	44.5%
2012														2.5%	1.1%	19.6%	29.1%
2013															-1.9%	13.9%	22.3%
2014																12.0%	18.2%
2015																	6.0%

This table shows the difference between the median of S&P 500 and the median of Russell 2000. Since 2004, the median of S&P 500 outperforms regularly the median of Russell 2000. In other words, if your stock-picking is not able to catch the extreme positive returns on Russell 2000, then shift to stock-picking within S&P 500, as the best proxy of your expected return (the median) is by far higher on the latter index.

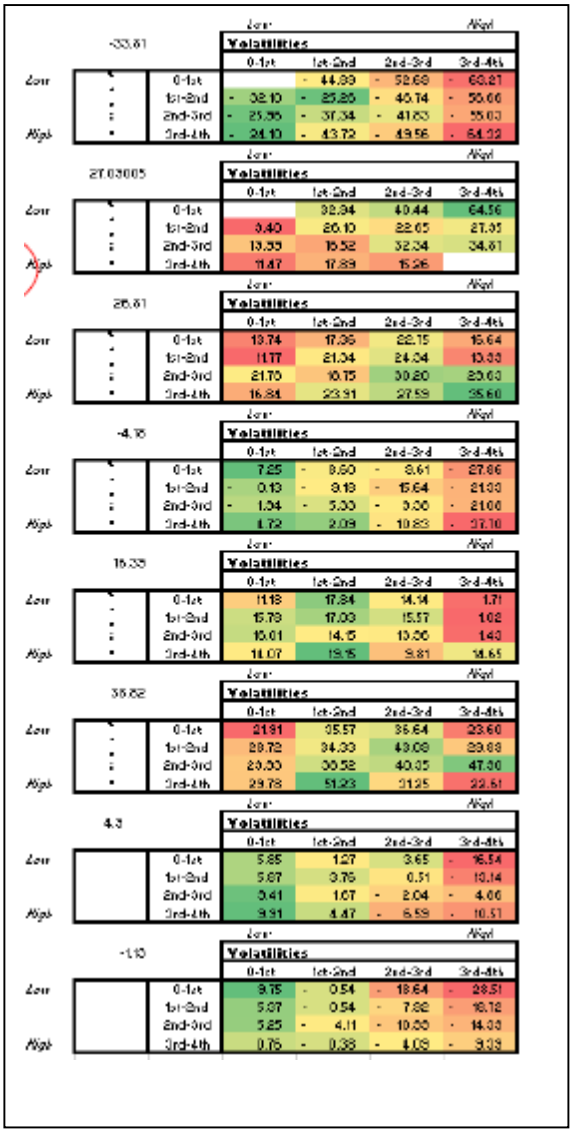
On the other hand, should you be interested in investing through ETFs, then you can choose to invest on Russell 2000 ETFs rather than on S&P 500 ETFs as you get the performance of the index. Until 2010, Russell 2000 Index used to outperform S&P 500 regularly.

Within the Russell 2000, may we exhibit any pattern ?

1999 -2007



2008-2015



Yearly performance of the Russell 2000 total Return (actuarial return)

Looking at the performance vs (capitalization (row); volatilities (column)) we can notice that although over the period, the performance of the index is largely positive (+249% total return between Dec, 31st 1998 and Nov, 11th 2015) – meaning it was a bull market with on average 7.7% per year, the red cells are much more represented on the right column of the table. This happens when the index performance is negative of course (2002, 2008), but it happens as well when the index performance is flat or mildly positive (2000, 2001, 2004, 2011, 2012, 2014, 2015).

On the other hand, these high volatility stocks strongly outperform the universe in two periods out of seventeen: 1999 and 2003, with respective total return performance of the Russell2000 of +21%, +47%.

This means that the outperformance of volatile small caps is very hard to capture because over the long run it may be easy to experience huge drawdowns with difficulties to recover. Keep in mind that when a stock drops by 50%, it needs to increase by 100% to come back to the initial level.

Regarding capitalization effect, things seem to be more difficult to explain.

As a summary for this part, should you want a smooth pattern, focusing on the low-volatility stocks in N-1 is worth in order to succeed in such a challenge, whereas dealing with historically high-volatility stocks may suffer from huge drawdowns (2002, 2008), and only rare astonishing performances, which may struggle in erasing the previous underperformance.

The issue is always the same: what is your investment timeframe? For more information: Why US investing differs a lot from European investing...

Conclusion

Due to the weight of extreme returns, the performance of Russell 2000 is pulled up dramatically. Russell 2000 is a non-representative index of small caps given that the small caps universe can be summarized as « many are called, but few are chosen »…but the ones which are chosen exhibit amazing performances (more than +1000% per year) hiding the many which are not chosen and post performances close to -100%. The asymetry of actuarial returns (compared to logarithmic returns) then emphasizes these extreme positive returns whose upper limit is + infinitiy, whereas a stock price cannot go below 0, flooring the extreme bad performance to -100%.

Second, given the asymetry of the investor with gain and loss, these extreme positive returns are not sustainable in a stock-picking framework, as everybody knows that human investor is likely to take profit on a largely winning position, meaning that it is very unlikely that he keeps an equity position whose performance already equals +100% per year. Therefore, studying small cap universe through the mean does not seem to take this behavioral bias into account. Using the median seems more relevant.

In addition to the data explained herebelow, investing in US Small Caps by picking stocks among Russell 2000 means struggling with scarce liquidity.

In a nutshell, should you want to invest on small caps, do it through Russell ETF ; should you want to pick up stocks, you should rather choose a S&P 500-equivalent universe, as the left tail of the distribution of S&P 500 is a lot thinner than the one of Russell 2000.

The arrival of ETFs and the increasing flows on these strategies and smart-beta and risk premia are likely to increase the pattern we exhibit in this paper.

As from now, when speaking about the outperformance of small caps, you can say ; « Small caps are smoke and mirrors : should you want to outperform the S&P 500, you have to be good at **picking up the stocks** (the famous 2% positive extremes), **AND** you have to be good at **timing the market** »

Companies whose aim is to pick up US Small Caps almost always underperform the Russell2000 (Median Performance of the Members << Index Performance). Now you are able to understand why. Would you rationally invest on such strategy ? (Too ?) Many people are convinced that they have the skills to pick up the famous 2% stocks that post astonishing performances. Be careful as too much self-confidence is likely to turn into overconfidence and a long-term underperformance..