STOCK NUMBERS

How many stocks should a portfolio contain?

The question has exercised academics for decades.

- In 1968, an influential research paper argued that you get almost all the benefits of diversification from owning about 10 stocks
- Others have since claimed that 30 is closer to the magic number
- Others still claim that 100 stocks may not be enough to achieve true diversification

After years of investigation, academia seems to be no closer to a final answer. And yet away from the ivory towers, many investors hold almost subconsciously to a belief that a certain number of stocks – it’s usually between 30 and 50 – is ‘about right’ for an actively managed portfolio.

The aim of this paper is to show why this isn’t necessarily the case. In fact, counting the number of stocks in a portfolio is a poor way to measure risk. It can even be, well, risky.

Total risk vs. Active risk

While diversification reduces the impact that any individual stock will have on overall performance, market risk is undiversifiable.

From an equity perspective, an investor might be considered fully diversified if they own all the constituents of the S&P500. But that won’t save them if the index plunges.

The issue here seems to be confusion between total risk – usually measured as the volatility of a portfolio – and active risk. Also known as tracking error, active risk is a measure of the variation in the active returns being generated against a benchmark (such as the S&P500). It’s a key metric: too little active risk and a portfolio manager will produce a portfolio that closely mimics the benchmark; too much and losses incurred could be large.

A poor guide to active risk

So are stock numbers a good indicator of active risk? The following chart, a variation of which most students of finance will have seen in a textbook, is one of the reasons some investors tend to think so. It shows the median, minimum and maximum tracking error versus the S&P500 for portfolios ranging from 20 stocks to 480 stocks. The tracking error estimates are generated using a multi-factor risk model.

From the chart, it might seem that targeting a specific number of stocks is a reasonable way to determine the level of active risk, since median tracking error falls the more securities you hold.

However, stock numbers mask substantial variations in tracking error over time. The chart on page 3 shows the effect of moving to an earlier time period, where the general level of market volatility was much higher.

In March 2009, in the depths of the financial crisis, market volatility spiked to around 33%pa. To generate a 3% tracking error at this time would have required a portfolio of 350 stocks.

The point here is that the level of active risk in a portfolio is in part determined by market volatility, which changes over time and from index to index.

It’s also influenced by many other factors, including the way the benchmark is structured, industry and regional concentrations, and investment style. A portfolio containing 40 mining stocks will clearly have different risk characteristics than a similar size portfolio whose constituents represent a range of industries.

When considering active (excess) performance, we should not look at the portfolio in isolation. The characteristics of the benchmark against which the portfolio is measured will affect portfolio stock numbers. For example, benchmarks have varying numbers of constituents. MSCI World presently has 1,645 constituents. In contrast Denmark’s OMX Copenhagen index has twenty companies, Germany’s DAX 30, thirty constituents, and the French CAC 40, forty constituents.

**Selected Benchmarks**

*Number of Constituents - as of June 30, 2016*

- DAX 30
- FTSE Global Titans
- FTSE 100
- FTSE Dubai 100
- Nikkei Stock Avg
- S&P 500
- MSCI EAFE
- TOPIX
- MSCI ACWI

S&P500 Index constituents only. All ex-ante risk data is from Barra multi-factor equity models, dated 31 May 2016. Each simulation has been run 100 times. Active portfolios hold from 20 to 480 stocks.

Source: S&P 500 Index constituents, MSCI Barra, SICM analysis
Stock weighting within the index will also affect portfolios which are managing risk relative to the benchmark. Although the S&P 500 Index has 505 constituents, the largest 10 companies account for 17.83% of the S&P 500 value while the top 100 account for 64.07%. Other benchmark characteristics will also come into play, such as country and industry make-up. Presently, the MSCI All Country World Index includes 46 countries, with the US alone accounting for 53% of the country breakdown.

In short, knowing that a manager typically holds 40 stocks tells the investor very little about the active risk they may be exposed to at any point in time. It’s much more important to understand how the manager monitors and controls risk.

An inefficient measure of efficiency

As every finance student is taught, owning multiple stocks makes it possible to achieve a more efficient portfolio: that is, one that offers more return for every unit of risk taken. This is why diversification has been called the only free lunch in investing.

However, there is no ideal number of stocks. We advocate the use of portfolio construction tools that incorporate risk models and systematic construction methods. The number of stocks to be held in the most efficient portfolio then becomes an output of the process, rather than an input.

Investors are also rightly concerned about cost-efficiency. All else equal, a portfolio with more holdings is likely to incur higher transaction charges. And as Figure 1 indicates, there appears be little benefit in having a very large portfolio since, past a certain point, active risk reduces only marginally as more and more stocks are added.

In reality, ‘all else’ is rarely equal, especially with regards to active management. Investment style – and particularly stock turnover – is likely to be a more important determinant of costs than the number of securities in the portfolio.

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Idea Dilution

Finally on the issue of efficiency, some investors worry that a manager with too many holdings will dilute their best ideas. Whether or not this is the case depends on the manager’s process. For example, quantitative managers who deploy algorithms may well be able to screen 300 stocks as easily as they can 30. In contrast, managers that conduct in-depth research on each stock may have the manpower to identify no more than 20 compelling investment ideas. Similarly, a manager that does not have a long-only constraint - i.e., they can take short positions as well as long - may be able to take a greater number of significant positions.

A hard habit to break

So far we’ve tried to show that the number of stocks in a portfolio isn’t, when considered in isolation, a useful risk measure. Since it is blind to volatility, correlations, stock weights and investment style, it says almost nothing about total risk, active risk or efficiency.

So why do so many investors hold to the idea that 30 to 50 stocks is about the right size for a portfolio? One possibility is that it’s a function of what Nobel Prize winner Daniel Kahneman calls our ‘System 1’ mode of thought – the quick-thinking part of our brain that has a tendency to look for easy answers when faced with complex issues. As Kahneman puts it, System 1 is instinctive, emotional and “radically insensitive to both the quality and the quantity of the information that gives rise to impressions and intuitions.”

A System 2 approach

We’d argue that diversification is far too important to be addressed using this type of reasoning. It’s necessary to engage System 2, the rational and coldly analytical part of our brains. This is why we think rules-of-thumb – such as using the number of stocks in a portfolio to judge risk or efficiency – should be treated with caution: they have the potential to give investors a false sense of confidence and lead to poor decision-making.

We suggest an approach is agnostic to portfolio size: portfolio size should be a consequence of the way portfolios are constructed, not an objective.

We usually agree a tracking error target with clients. This allows for the use of multi-factor risk models – which break risk down into its component parts, such as value, growth, region, industry sector and so on – to monitor risk levels and ensure adherence to the risk target.

As noted above, portfolio optimization techniques can be used to fine-tune the weight of each holding.

Since old habits die hard, a voice in the back of some readers’ minds will doubtless be asking: that’s all very well, but how many stocks do you end up with? It varies over time, normally ranging from 25 to 100+ in our portfolios, which target a tracking error of 4% per annum. If you target a certain level of active risk, then stock numbers will vary as market volatility varies. The inverse is also true. If you target a specific number of stocks, then active risk will vary as market volatility varies. So, targeting a stock number fails to give the investment manager or asset owner a consistent level of diversification.

What influences stock numbers?

Market volatility
Benchmark structure
Stock correlations
Investment style / portfolio beta
Active risk

CONTACT

Paul Spence
paul.spence@sicm.com

John Willis
john.willis@sicm.com

Carolyn Roose
carolyn.roose@sicm.com

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