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An index fund is a portfolio that aims to mimic as possible a designated index, generally a broad-based stock or bond index. For example, some of the most popular index funds target the Standard and Poor's index of 500 large stocks. The SP500 is a market capitalization weighted index. This means that the weight of each stock in the index is the market cap of that stock divided by the sum of the market caps for all 500 stocks. While market cap weighting is a reasonable way to go, it is not the only way to build a portfolio. An alternative weighting scheme is equal weighting, where you put a fraction of $1/N$ of your portfolio into each of N stocks. Others ways to index would be to weight by total sales or number of employees or by other fundamental indicators.

Is there a good reason to choose market cap weighting over equal weighting or fundamental weighting? Financial theory, as developed in Modern Portfolio Theory (MPT), the Efficient Markets Hypothesis (EMH) and the Capital Asset Pricing Model (CAPM), supports market cap weighting. In theory, the optimal portfolio is the "market portfolio" comprised of market cap weighting of all risky assets. Another nice feature of market cap weights is that it minimizes the need for rebalancing the portfolio. After all, if you held the world wealth portfolio, there would be no need to change weights at all, except for the introduction of newly traded assets, like Initial Public Offerings and the like.

Recently, some economists have asserted that portfolios based on non-market cap weights are likely to outperform market cap weighted portfolios. The reason is market inefficiency. Suppose that the EMH does not hold, and that observed market prices include fair value plus or minus a random error. In this scheme, a market cap weighted portfolio will tend to overweight the stocks that are priced too high (have a positive error term) and underweight the stocks that are priced too low (have a negative error term). An equal weighted portfolio would not display this bias. On the assumption that pricing errors are not persistent, then it would seem that "low" priced stocks would tend to outperform "high" priced stocks, so the EW portfolio might well outperform. According to economist and portfolio manager Robert Arnott, proprietor of Research Associates, a family of fundamentally weighted portfolios, this prediction is borne out in the historical data.

One downside to equal weighting, or other fundamental weighting, is the need for rebalancing. Typically, fundamentally weighted funds are re-balanced at least quarterly. This may entail substantial transactions costs, including commissions and bid/ask spreads. Naturally, if you create a fundamentally weighted portfolio and subsequently do not re-balance, the portfolio will gradually move away from the initial weighting scheme. In particular, the weights of strongly performing companies will grow and the weights of weakly performing companies will shrink. That may be a feature, not a bug. After all, the same phenomenon occurs with market cap weighted portfolios.

The real question, it seems to me, is the extent of transaction costs. It might seem that in today's world of heavily discounted commissions transaction costs are minor. If this is your view, consider the following story.

Renaissance Technologies

Renaissance Technologies is the top performing hedge fund in the world. Founded by mathematician James Simon, the fund has compiled over the past thirty years a 39% annual compounded return (after fees). The main fund, Medallion, has been closed to outside investors for years. The fund is maintained at \$20 billion by an annual disbursement of all gains to investors (nearly all of whom are Renaissance employees). The staff is comprised of world class mathematicians, statisticians and computer scientists. The strategy is purely quantitative. According to economist George Gilder, Renaissance is the global leader in applying Markov Chains, the key analytical tool underlying a variety of famous applications including Google's search algorithm, speech recognition, machine learning and AI (artificial intelligence). A Markov Chain is a mathematical model that describes how a random process evolves over time. At each point in time, the process may take on a number of different values, or "states." The key feature of the Markov Chain is that the probability of moving from one state to another is dependent only on the current state, the prior history is irrelevant. To implement a Markov Chain, one must estimate something called the "transition matrix" which is a collection of the probabilities of moving from each state to every other state. Given a set of estimated (and constantly updated) transition probabilities, the chain can be used to forecast future evolution of the process. Since the number of variables and states may be quite large, the computational facility required to continuously roll out forecasts and test for forecast accuracy is immense. This gives a large advantage to entities that deploy huge computational capabilities, maintain massive data bases, and employ the smartest STEM people on the planet, as does Renaissance.

The Renaissance strategy involves a huge amount of very short-term trading. If you tend to trade a lot, you might well be on the other side of the Renaissance strategy. That is not a good place to be. In general, for most investors it is a good idea to minimize the number of transactions.

Deploying an Equal Weight Portfolio

Let's suppose we want to avoid establishing a market cap weighted portfolio. Is there a way to obtain the benefits of fundamental weighting without extensive trading? Sure, deploy the strategy at time of purchase and then forget about it. For example, establish your portfolio by purchasing N stocks, spending $1/N$ dollars per stock. If you believe you have some skill in stock selection, then N should be small, say less than ten. If you do not believe you have skill, then N should be large, say more than fifty. Once the portfolio is up and running, and assuming the portfolio is generating cash (cash inflows exceeding cash outflows), make additional purchases on market setbacks. If you buy individual stocks

you will pay no management fees and if you don't sell you'll incur no additional transaction costs after the initial purchases.

Is there any evidence that this would be a good strategy? Consider the “coffee can” portfolio story told by former Capital Guardian CEO and equity money manager Robert Kirby. Kirby advised a wealthy woman whose husband managed his own portfolio. After both husband and wife died, Kirby was named trustee for each estate. Once he had the opportunity to review the husband's portfolio, Kirby was annoyed to find that the husband had “free-riden” on Kirby's advice to the wife – every time Kirby recommended to the wife a stock to buy, the husband bought it for his portfolio. However, the husband ignored every Kirby sell recommendation. After being annoyed, Kirby was chagrined to find that the husband's portfolio had far outperformed the wife's. He concluded that it is easier to make smart buy decisions than smart sell decisions. Kirby named the husband's strategy the “coffee can” (aka “buy and forget”) portfolio, and suggested that this may be a better way to manage portfolios but would not be economically feasible for a company like Capital Guardian to offer such a product to customers.

The investment management company with which I am most familiar is SAM (Speakes Asset Management). SAM deploys a strategy we call the Equal Weighted Large Cap Value Coffee Can (EWLCVCC). The initial portfolio for each SAM client (so far there is only one) consists of 1% of portfolio value invested in each of 100 more or randomly selected individual stocks. A few years ago, the commission cost of establishing the initial portfolio would have been \$495; today it is zero (except for the risk of being on the other side of a trade with Renaissance Technologies). Subsequent changes to the portfolio consist of investing in one new security (again, randomly chosen) each time the following occurs: a) cash accumulates to at least 1% of portfolio value and b) the market has declined at least 10% relative to the prior market high or prior purchase point. This is the “rebalancing strategy” for falling markets. What about the rebalancing strategy for rising markets? SAM has a plan for this. The plan is to cut in half the position in any of the 100+ individual stocks should that position grow to exceed 10% of the entire portfolio. Should this occur, SAM will attempt to offset the taxable capital gain by taking losses on underwater positions.

Is the SAM strategy preferable to a broad-based market cap weighted index fund? Maybe yes, maybe no. It does offer less diversification, but on the other hand it entails lower transaction costs, is more tax efficient, and is not much more difficult to implement.