

## Session 2A: Post Class Test Solutions

1.
  - I would use a market-cap weighted index, because it reflects what is happening, in the aggregate, to investor portfolios. An equally weighted index does not, since it weights small companies that are miniscule percentages of investor portfolios the same as the largest companies, which have a much bigger impact.
  - The returns on a market-cap index, though, because it is tilted towards the largest market cap stocks, may not be representative of the typical stock in the market. Thus, you can have a market cap weighted index increase strongly, even though 65% of the stocks dropped in value.
2. d. The NASDAQ gets a disproportionate share of its value from technology companies. The NASDAQ has more than enough companies (3300), and if they drew from across sectors and types of companies. It is the fact that 48% of the NASDAQ is tech that makes it an index that is not representative of the larger US equity market.
3. a. This study suffers from two biases. First, by classifying companies based upon market cap at the end of the period (in 2020) rather than at the beginning of the period (2000), it is biased towards concluding that large cap companies are better investments; companies end up with large market capitalizations by outperforming the market over time. Second, by looking at only firms that have 20 years of data, it is ignoring all of the firms that you could have invested in 2000 that did not survive the 20-year period.  
b. To test this hypothesis, I would go back to 2000, and classify firms into market cap classes, based on market cap then. I would then track returns over time on these firms, incorporating the returns I would have made on firms that failed or were acquired during the period.
4. a. My primary concern is that the sample includes CEO changes that were reported in the Wall Street Journal. The Wall Street Journal is a good source, but it is not comprehensive, and is more likely to report on CEO changes at larger, more widely followed companies. In addition, the date on which the news story show up in the journal may not capture the actual date, perhaps lagging it by a day or two.  
  
b. I would check other sources, for at least a sub-period, to chronicle the extent of the bias. (What percent of actual CEO changes were reported on in the Wall Street Journal? Were CEO firings more likely to be reported upon, as opposed to CEOs who voluntarily step down?) Since announcement dates are difficult to check, I would extend the return window (from 10 days before to 10 days after), and hope that making the window longer would capture any date lags.
5.
  - a. Annual return, with 95% confidence =  $12.18\% \pm 2 (19.49\%/\sqrt{50}) = 6.67\%$  to  $17.69\%$
  - b. This is based upon 50 years of data (1971-2020), during which period the economy and the market changed dramatically, with a shift from manufacturing to technology in sectors, and from the US to the rest of the world in terms of global economic power. In other words, if the market has changed, this range may not be a good indicator of the future.

c. Break up the data into subperiods (five decades, for instance) and compute the average return and standard error in each period. If the underlying market is not changing, there can be differences across the decades, but the differences should fall within statistical bounds.