<table>
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<th>Concepts</th>
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| **Characteristics of an equity index** | 1. Rules-based: rules (i.e.: including / excluding stocks, weighting scheme, rebalancing frequency) must be consistent, objective and predictable  
2. Transparent: underlying rules are public, clearly stated and understandable  
3. Investable: Investors can replicate the risk and return of the index |
| **Considerations when choosing a benchmark** | 1. Market segment: broad market vs. focus to certain sectors; domestic vs. international; developed vs. emerging vs. frontier markets  
2. Capitalisation (size factor): Large-cap vs Mid-cap vs. Small-cap (Small-cap has higher risk and expected returns)  
3. Growth vs. value (style factor): growth stocks (high P/E, P/B) vs. value stocks (low P/E, P/B) |
| **Method for Constructing Index** | 1. Stock selection:  
   - Exhaustive method: every stocks in a defined universe (e.g.: CRSP US Total Market Index)  
   - Selective method: subset of stocks within a universe (e.g.: S&P 500)  
2. Stock weighting:  
   - Market-cap weighting method: weight each stock in the portfolio as % of its capitalisation / index capitalisation  
   - Large-cap stocks have higher liquidity → can be thought as liquidity-weighted  
   - Free-float weighting: stock market cap exclude closely-held shares not available to market participants (held by insiders, promoters, governments)  
   - Price weighting method: weight each stock by its price  
   - Equal weighting method: weight each stock equally  
   - Reduce concentration risk  
   - Slow to change sector exposures  
   - Small-cap bias → more volatile  
   - Small-cap bias → lower liquidity → limited investment capacity  
   - Fundamental weighting method: weight each stock based on fundamental factors (e.g.: revenue, income, dividends)  
3. Stock concentration: used to calculated the effective number of stocks in the portfolio, in order to replicate the index. Stock concentration is calculated using HHI
   \[ HH \equiv \sum w_i^2 \]  
   \[ \text{effective number of stocks} = 1/HHI \]  
   \[ w_i = \text{weight of stock } i \] |
| **Method for Maintaining Index** | 1. Rebalancing: update stock weight in the index to reflect change in market cap  
2. Reconstitution: remove / replace stocks that no longer fit the index market exposure; add new stocks that fit in |
| **Passive factor-based strategy** | Passive factor-based strategy (smart beta): create a portfolio with same exposures to a set of risk factors as the index. Common risk factors include:  
- Growth factor: stocks with high P/E, P/B, above-average net income growth  
- Value factor: mature stocks with low P/E, P/B, stable net income, high dividend yield  
- Size factor: stocks with low market caps  
- Yield factor: high dividend-yield stocks  
- Momentum factor: stocks with recent above-average returns  
- Quality factor: stocks with consistent growth, high CF-to-EBITDA, high CF-to-earnings, high dividend yield, etc.  
- Volatility factor: stocks with low standard deviation of return  
Types of passive factor-based strategy:  
- Return-oriented: include dividend yield; momentum; fundamentally-weighted strategies; etc.  
- Risk-oriented: include volatility weighting (weight of shares of price volatility); minimum-variance investing; etc.  
- Diversification-oriented: equally-weighted; maximum diversification; etc.  
Advantages of passive factor-based strategy:  
- Less costly than active management  
- Still offer factor exposure based on investor’s view of the market  
Disadvantages of passive factor-based strategy:  
- Higher management fees and trade commissions than passive cap-weighted investing |

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