Passive Equity Investing

2020 Exam

Introduction and Contents

1. Introduction
2. Choosing a Benchmark
3. Approaches to Passive Equity Investing
4. Portfolio Construction
5. Tracking Error Management
6. Sources of Return and Risk in Passive Equity Portfolios

2. Choosing a Benchmark

1. Indexes as a Basis for Investment
2. Considerations When Choosing a Benchmark Index
3. Index Construction Methodologies
4. Factor-Based Strategies

2.1 Indexes as a Basis for Investment

Three requirements for an index to become the basis for an investment strategy

1. Rules-based
2. Transparent
3. Investable

Making indexes more investable

- Free-float adjustment
- Buffering
- Packeting

2.2 Considerations when Choosing a Benchmark Index

Desired market exposure

- Broad versus sectors
- Domestic versus international

Risk-factor exposure

- Size
- Style
- Momentum
- Liquidity
- Quality

Broad market indexes	5,658	
Sector indexes	3,479	9,165
Not classified	28	
Of the 5,658 broad market indexes:		
Developed markets	2,903	
Emerging markets	1,701	
Developed & emerging markets	1,050	
Not classified	4	
Of the 5,658 broad market indexes:		
All-cap stocks	1,892	
Large-cap stocks	121	
Large-cap and mid-cap stocks	2,100	
Mid-cap stocks	657	
Mid- and small-cap stocks	39	
Small-cap stocks	846	
Not classified	3	

Source: Morningstar Direct, May 2017.

2.2 Considerations when Choosing a Benchmark Index

Desired market exposure

- Broad versus sectors
- Domestic versus international

Broad market indexes	5,658	
Sector indexes	3,479	9,165
Not classified	28	

Risk-factor exposure

- Size
- Style
- Momentum
- Liquidity
- Quality

2.3 Index Construction Methodologies (1/2)

Stock inclusion methods: exhaustive versus selective

Method	Weight Calculation	Comment
Market-cap weighted (free-float weighted)	Stock's market capitalization divided by total market capitalization	Free-float weighted → more investable Large-cap bias High market cap → high liquidity Mean-variance efficient
Price weighted	Stock price divided by sum of stock prices in index	One share of each constituent security Stock split complicates index calculation
Equally weighted	With n stocks the weight of each stock is 1/n	Low concentration risk Low changing sector exposure Small cap bias; high volatility Limited investability Rebalancing
Fundamental weighted	Weight based on company or stocks fundamental characteristics	Philosophy: stock price will converge to price implied by fundamentals

2.3 Index Construction Methodologies (2/2)

Index concentration can be measured using the Herfindahl-Hirschman Index (HHI)

$$\mathrm{HHI} = \sum_{i=1}^{n} w_i^2$$

Effective number of stocks = 1 / HHI

Effective number of stocks held in equal weight that would mimic concentration level

Reconstitution

Rebalancing

EXAMPLE 1

Effective Number of Stocks

A market-cap-weighted index contains 50 stocks. The five largest-cap stocks have weights of 0.089, 0.080, 0.065, 0.059, and 0.053. The bottom 45 stocks represent the remaining weight of 0.654, and the sum of the squares of those weights is 0.01405. What are the portfolio's Herfindahl–Hirschman Index and effective number of stocks held?

The stocks, their weights, and their squared weights are shown in Exhibit 3.

Exhibit 3 Calculations for Effective Number of Stocks

Stock	Weight	Squared Weight
1	0.089	0.00792
2	0.080	0.00640
3	0.065	0.00423
4	0.059	0.00348
5	0.053	0.00281
Stocks 6–50	0.654	Sum of squared weights for stocks 6–50: 0.01405
Total for stocks 1–50	1.000	0.03889

2.4 Factor-Based Strategies (1/2)

Most benchmark returns are driven by factors that can be identified and isolated

Growth	Growth stocks are generally associated with high-performing companies with an above-average net income growth rate and high P/Es.
Value	Value stocks are generally associated with mature companies that have stable net incomes or are experiencing a cyclical downturn. Value stocks frequently have low price-to-book and price-to-earnings ratios as well as high dividend yields.
Size	A tilt toward smaller size involves buying stocks with low float-adjusted market capitalization.
Yield	Yield is identified as dividend yield relative to other stocks. High dividend-yielding stocks may provide excess returns in low interest rate environments.
Momentum	Momentum attempts to capture further returns from stocks that have experienced an above-average increase in price during the prior period.
Quality	Quality stocks might include those with consistent earnings and dividend growth, high cash flow to earnings, and low debt-to-equity ratios.
Volatility	Low volatility is generally desired by investors seeking to lower their downside risk. Volatility is often measured as the standard deviation of stock returns.

Investors can seek exposure to particular factors and/or overweight or underweight certain factors

Decisions needs to be made on timing and degree of factor exposure

Risk: factor might become out of favor

Higher management fee

2.4 Factor-Based Strategies (1/2)

- Return-oriented
  - Dividend yield
  - Momentum
  - Fundamentally weighted

- Risk oriented
  - Seek to reduce volatility
  - Weight inversely related to volatility

- Diversification oriented
  - Simple example: equal weighting
  - Determine weights so as to maximize future diversification

3. Approaches to Passive Equity Investing

1. Pooled Investments
2. Derivatives-Based Approaches
3. Separately Managed Equity Index-Based Portfolios

3.1 Pooled Investments (1/2)

Major types: open end mutual funds and exchange-traded funds

Needs analysis → fund(s)

Mutual Funds

- Mutual fund shares can be purchased through
  - Fund manager
  - Individual financial adviser
  - Fund marketplace
- Convenient and cost effective
  - Work outsourced to fund manager
- Constraints
  - Bought/sold based on closing prices
  - Can not be shorted
  - No margin purchases

3.1 Pooled Investments (2/2)

Exchange-Traded Funds (ETFs)

- Convenient and cost effective
- Advantages of ETFs over open-end mutual funds
  - Bought/sold during trading day
  - Short positions and margin borrowing
  - Slightly lower expense ratio
  - Unique structure → tax efficiency
  - Track many more equity indexes
- Disadvantages
  - Not all indexes are tracked by an ETF
  - Bid-ask spread
  - Liquidity risk
  - Commission costs / brokerage fees
- Factor-based ETFs track one or more factors

3.2 Derivatives-Based Approaches (1/2)

- Benchmark performance can be replicated using derivatives
- Derivatives are typically used to adjust pre-existing portfolios
  - Completion overlay
  - Rebalancing overlay
  - Currency overlay
- Advantages
  - Cost effective
  - Easy to implement
  - Leverage
- Disadvantages
  - Lack of availability/accessibility
  - Restrictions
  - Counterparty risk
  - Roll over

3.2 Derivatives-Based Approaches (2/2)

Equity Index Futures

- Increase/decrease exposure to an index portfolio through a single transaction
- Typically have a multiplier
- Initial margin and maintenance margin
- Some contracts may be more liquid than underlying securities
- Easy to take short position
- Limited number of equity index futures
- Basis risk

Equity Swaps

- Negotiated agreements in which two parties agree to exchange cash flows
- Can be used to increase or decrease exposure to a benchmark
- Avoid paying taxes on full equity return amount
- More available swaps compared to futures
- Counterparty, liquidity, interest rate and tax policy risk

3.3 Separately Managed Equity Index-Based Portfolios

- For large investors it can be cost effective to build own portfolio
- Several capabilities and tools are required to build a separately managed portfolio
  - Data subscription
  - Trading systems
  - Accounting systems
  - Broker relationships
  - Compliance tools
- Managers buys securities using a program trade
- Managers must review holdings frequently
  - Make trades based on index changes
  - Reinvest cash dividend payments
- Trade execution typically takes place at close of business day

4. Portfolio Construction

1. Full Replication
2. Stratified Sampling
3. Optimization
4. Blended Approach

4.1 Full Replication

- Full replication: hold all securities represented by the index
- Some indexes are more conducive to full replication
- Portfolio manager uses data from index provider to construct portfolio
- Data is imported into a data compiler or an OMS
- OMS should have a pre-trade compliance check feature
- Manager must keep portfolio in sync with index
- As the number of securities increases
  - tracking error decreases
  - trading cost increases

4.2 Stratified Sampling

- Not always practical to hold all securities in an index
- Stratified sampling is used when index has many constituent securities or when assets under management are low
- Split population into strata and then sample from strata
- Through stratified sampling a limited sample can closely track index

EXAMPLE 2

Stratified Sampling

A portfolio manager responsible for accounts of high-net-worth individuals is asked to build an index portfolio that tracks the S&P 500 Value Index, which has more than 300 constituents. The manager and the client agree that the minimum account size will be USD 750,000, but the manager explains to the client that full replication is not feasible at a reasonable cost because of the mandate size. How can the manager use stratified sampling to achieve her goal of tracking the S&P 500 Value Index?

4.3 Optimization

- Optimization: maximize desirable characteristic or minimize undesirable characteristic subject to one or more constraints
- Simply minimizing tracking error can lead to a portfolio that is not mean-variance efficient versus the benchmark
- Optimization can be conducted in conjunction with stratified sampling
- Advantages: low tracking error relative to stratified sampling; explicitly considers correlations
- Disadvantages: optimization needs to be run frequently → frequent adjustments; requires high level of technical sophistication

4.4 Blended Approach

- If an index has a large number of constituents, a blended approach can be used
- Full replication for liquid securities and stratified sampling or optimization for less liquid securities

5. Tracking Error Management

1. Tracking Error and Excess Return
2. Potential Causes of Tracking Error and Excess Return
3. Controlling Tracking Error

5.1 Tracking Error and Excess Return

- Tracking error measures the extent to which a portfolio tracks a benchmark
  - Standard deviation of the difference between the portfolio return and benchmark return
- Excess return is the difference between the portfolio return and the benchmark return
  - Possible to have a high tracking error but a zero excess return
- Index fund managers try to maintain:
  - low tracking error
  - excess return that is not negative
- Tracking error varies depending on:
  - manager's approach to track the index
  - data frequency
- Degree of tracking error varies over time

EXAMPLE 3

Tracking Error and Excess Return

Exhibit 12 illustrates key portfolio metrics for three of the older and larger conventional open-end funds in the Australian and South Korean markets. Based on the levels of tracking error and excess return figures provided in the exhibit, explain whether the funds are likely replicating or sampling.

Fund Name (Holdings)	Holdings	Annual Management Fee (bps)	3-Year Annualized Tracking Error	3-Year Annualized Excess Return
Australian market benchmark for the following funds is the S&P/ASX 300 Index. Number of securities in the index: 300.				
BlackRock Indexed Australian Equity Fund	296	20	0.0347%	−0.1684%
Macquarie True Index Australian Shares	259	0	0.0167%	0.0111%
Vanguard Australian Shares Index	293	18	0.1084%	−0.1814%
South Korean market benchmark for the funds below is the KRX KOSPI 200 Korea Index. Number of securities in the index: 200.				
KB Star Korea Index Equity CE	190	36	1.2671%	0.3356%
KIM Cruise Index F2.8 Equity-Deriv A	178	9	1.5019%	1.7381%
Samsung Index Premium Equity-Deriv A	204	40	1.3325%	1.1097%

5.2 Potential Causes of Tracking Error and Excess Return

- Fees charged
- Number of securities
- Intra-day trading
- Trading commissions
- Cash holdings

5.3 Controlling Tracking Error

- Minimize cash
- Invest at valuations used by index provider
- Maintain beta of 1 relative to index
- Keep risk factor exposures similar to those of the index

6. Sources of Return and Risk in Passive Equity Portfolios

1. Attribution Analysis
2. Securities Lending
3. Investor Activism and Engagement by Passive Managers

6.1 Attribution Analysis

- **Attribution analysis:** analysis of sources of return of the portfolio and the underlying index
- Sources of return include: company-specific, sector, country, currency, etc.
- Portfolio managers should understand what factors are driving returns of portfolio and index

		Portfolio X		Benchmark for Portfolio X		Attribution Analysis
Sector	Sector Return (A)	Sector Weight (B)	Contribution to Return (C) = (A) × (B)	Sector Weight (D)	Contribution to Return (E) = (A) × (D)	Difference (F) = (C) – (E)
Total	5.62	100.00	5.62	100.00	5.65	–0.03
Telecom. Services	16.94	2.25	0.38	2.34	0.40	–0.02
Utilities	15.45	12.99	2.01	13.03	2.01	–0.01
Consumer Discretionary	12.09	3.89	0.47	3.90	0.47	0.00

6.2 Securities Lending

- Fund managers can lend shares to short-sellers and other market participants for a fee
  - Lending agent is often used
  - Borrower posts collateral

- Security lending fees help offset portfolio management costs

- Major risks:
  - Quality of borrower (credit risk)
  - Value of posted collateral (market risk)

6.3 Investor Activism and Engagement by Passive Managers

- Index fund managers are among the largest shareholders of many companies
  - Access to senior management
  - Vote shares and participate in governance improvements
- Better governance can lead to improvements in operations and oversight
- Voting and company engagement can be a return-enhancing activity
- Arguably passive investors have higher duty to improve governance relative to active investors
- Counter arguments
  - Potential conflicts of interest
  - Company management might give more importance to active investors

Summary

- Considerations in choosing a benchmark for passively managed equity portfolios
- Passive factor-based strategies versus market-capitalization weighted indexing
- Different approaches to passive investing
- Full replication, stratified sampling and optimization
- Causes of tracking error
- Methods to control tracking error
- Sources of return and risk for passively managed portfolios