

## **Welcome!**

I wrote these notes based on the feedback from my students....almost 100% of them said they just don't have the time to read the entire curriculum, so they wished they had a set of notes that they could rely on to give them a solid knowledge base, show them how the concepts might be applied on the exam and guidance on what topics to touch lightly and what topics to study hard....

So that is exactly what I did, and you are now looking at an excerpt from the study notes that will allow you to:

- 1) Learn the complex financial concepts required to answer CFA exam questions.
- 2) Expand your knowledge base, layering in extra marks to get you over the passing score.
- 3) Retain your knowledge right up to the exam day.

Best of luck with your studies!

Prof. Brian Gordon, CFA, CFP, CIM, MBA, FCSI

P.S. To get the greatest benefit out of using the notes, I suggest that you print the CFA Curriculum Learning Outcome Statements (LOS) and use them as a guide as you go through the notes....you will see my bolded titles follow along with the LOS telling you exactly what you need to know.

## **Level 3**

### **Study Session 9**

#### **Asset Allocation and Related Decisions in Portfolio Management**

##### **READING 18:**

##### **Currency Management: An Introduction**

##### **READING 19:**

##### **Market Indexes and Benchmarks**

# Currency Management: An Introduction

## Review if Basic FX Concepts

### Quotations

According to our CFA readings \$:€ means ``Euros per Dollar``

Where:

\$ is the quoted currency

€ is the currency in which the price is expressed

### Another way of showing this is \$/€

\$ <= Quoted or price currency

€ <= Base currency

An exchange rate is the price of the *base* currency expressed in terms of the *price* currency.

For example, a CAD/EUR rate of 1.55 means the euro, the base currency, costs 1.55 Canadian dollars

### Forward Premium/discount

Forward exchange rates can be higher or lower than current spot exchange rates:

- If the forward exchange rate is higher than the current spot exchange rate, the forward is “**trading at a premium**” relative to the spot.
- If the forward exchange rate is lower than the current spot exchange rate, the forward is “**trading at a discount**” relative to the spot.

The question will be which currency is trading at a premium or discount?

### Exam tip:

To answer this you must refer to the quotation.....the premium or discount is always in relation to the BASE currency!

## Forward Points

In terms of “points”: (+) Premium or (-) Discount =  $F - S$  <= “scale by 10,000”

In terms of percent: (+) Premium or (-) Discount in % =  $[(F - S) / S] \times 100$

On the exam you may be given a table and have to use it to recognize a forward premium or discount, calculate the premium or discount or calculate the forward or spot rate given the “points”:

### Forward/Spot Learning Example:

Table 1

Currencies	Forward	Spot	Points
USD/EUR		1.0155	+125
GBP/CAD	0.55		-80

1. Based on the information in Table 1 state which currencies are trading at a forward premium and which currencies are trading at a forward discount. (Hint: No calculations required)
2. Calculate the USD/EUR forward exchange rate:
3. Calculate the GBP/CAD spot exchange rate:

**Solutions:**

1. The points tell us right away...if the points are positive, then the forward is trading at a premium and if the points are negative then the forward is trading at a discount.

In the first currency pair, the EUR is the base currency and so it is trading at a premium relative to the USD.....and it follows that the USD must be trading at a forward discount to the EUR!

In the second currency pair, the CAD is the base currency and so it is trading at a discount relative to the GBP.....and it follows that the GBP must be trading at a forward premium to the CAD!

2.  $F_{USD/EUR} = S_{USD/EUR} + (\text{points}/10,000)$   
 $F_{USD/EUR} = 1.0155 + (125/10,000)$   
 $F_{USD/EUR} = 1.028$
3.  $S_{GBP/CAD} = F_{GBP/CAD} - (\text{points}/10,000)$   
 $S_{GBP/CAD} = 0.55 - (-80/10,000)$   
 $S_{GBP/CAD} = 0.558$

## Mark to Market

There is no cash flow on a forward contract until the settlement date.

Mark to market, reflects the profit or loss that would be realized from closing out the position at current market prices.

### Mark to Market Learning Example:

Assume an investor buys a 12 month forward contract for 1,000,000 CAD at an “all in” forward rate of 1.50 EUR/CAD. Three months later the investor wants to close out the position and is presented the following information from the FX dealer.

**Table 3**

	Bid	Ask
Spot <u>EUR</u> CAD	1.511	1.512
Forward Points	+ 100	+ 110
270 day CAD LIBOR	3.25%	
270 day EUR LIBOR	2.05%	

1. At which rate would the investor “sell the CAD forward”?
2. Calculate the settlement cash flow when the position is closed
3. Calculate the mark to market on the investor’s position

### **Solutions:**

1. Since the CAD is lined up as the base currency in our quote, the investor would sell the CAD forward at the Bid and receive  $1.511 + (100/10,000) = 1.521$  EUR for each CAD
2. The CAD has appreciated vs. the EUR, so the settlement cash flow will be  
 $= (1.521 - 1.50) \times 1,000,000 = 21,000$  EUR  
This will be paid in 9 months when the contract expires
3. The mark to market position will be the present value of the settlement cash flow.  
 $= 21,000 / [1 + (2.05\%)(270/360)] = 20,682.01$  EUR

## Currency effects on portfolio risk and return

### Return

The return on a **domestic asset** is not affected by exchange rate movements

The return on a **foreign asset** is affected by exchange rate movements

Foreign currency return ( $R_{FC}$ ) = Return of the foreign asset in foreign currency terms

Domestic currency return ( $R_{DC}$ ) = Foreign currency return +/- % $\Delta$  Exchange Rate ( $R_{FX}$ )

$$R_{DC} = (1 + R_{FC})(1 + R_{FX}) - 1$$

#### Be aware:

In the  $R_{FX}$ , the investor's domestic currency is always the price currency!

Domestic return on a portfolio of multiple foreign assets is the weighted average of all the domestic currency returns for each foreign asset.

### Risk

$$\text{Var}(R_{DC}) = \text{Var}(R_{FC}) + \text{Var}(R_{FX}) + (2)SD(R_{FC})SD(R_{FX})(r)$$

$$SD(R_{DC}) = \sqrt{\text{Var}(R_{DC})}$$

Think of the standard deviation for a 2 asset portfolio without the weights!

### Bottom Line:

Currency matters as it can have a significant impact on investment risk and returns

## Strategic Choices

Managers can hedge all currency risk, leave the portfolio unhedged, thinking currency fluctuations “even out” in the long run or actively trade foreign exchange seeking additional sources of return.

**1) Passive Hedging** – belief is currency exposures add risk without enough additional return to justify the additional risk, so the goal is to match the benchmark currency exposures.

**2) Discretionary Hedging** – similar to passive with the primary goal of managing currency risk, except the manager has the ability to let the currency exposures differ slightly from the benchmark in an attempt to add additional return.

**3) Active Currency Management** – the goal is to seek additional return by taking on currency risk exposure.

**4) Currency Overlay** – active currency management done by external sub advisors.

### **Bottom Line:**

Watch for clues regarding the costs vs. benefits of trading currency as your signal to select the most appropriate strategy.

## Currency Management Program

On the exam you will need to bring together the investor’s objectives and constraints with the capital market expectations to formulate an appropriate strategic hedging strategy:

<b>Information in the question</b>	<b>Strategy</b>
The shorter time horizon	More fully hedged
Lower risk tolerance	More fully hedged
Higher liquidity needs	More fully hedged
High short term income needs	More fully hedged
The higher the exposure to foreign assets	More fully hedged
Low cost to manage currency risk	More fully hedged
If markets are “highly volatile”	More fully hedged
Questions about the skill/ability regarding active currency manager	More fully hedged
View currencies as a separate asset class	Less hedged

## Active Currency Trading Strategies

### 1) Based on Economic Fundamental

Based on the belief that the long run real exchange rate represents a currency's "fair value" and short term deviations from this long run value represent trading opportunities.

Factor	Effect on Base Currency
Increase in long run real exchange rate	Appreciation
Increase in interest rates	Appreciation
Increase in foreign expected inflation	Appreciation
Increase in foreign risk premium	Appreciation
Real exchange rate below long run value	Appreciation

### 2) Based on Technical Analysis

Economic analysis not required because it is already factored into the exchange rate.

Historical price patterns tend to repeat, providing trading opportunities.

Human behavior determines where exchange rates will trade, not what they should be trading at.

Technicians look for signals indicating "overbought" or "oversold" market conditions.

### 3) FX Carry Trade

This strategy attempts to exploit the breakdown of the fundamental economic relationship between currency exchange rate movements and interest rate differentials.

**Interest Rate Parity (IRP) says:**

$$\% \Delta S_{H/L} = i_H - i_L$$

**FX Carry Trade says:**

$$\% \Delta S_{H/L} \neq i_H - i_L$$

Where:

$\% \Delta S_{H/L}$  = Percentage change in the exchange rate

$i_H$  = Interest rate in the "high yield" country

$i_L$  = Interest rate in the "low yield" country

The FX carry strategy is accomplished by borrowing (or shorting) the “low yield” currency and at the same time, investing (or going long) in the “high yield” currency.

**Forward rate bias** – says IRP does not hold

*Trading the forward rate bias* involves selling the currency that is trading at a forward premium and at the same time buying the currency that is trading at a forward discount.

**Trivial Points to be aware of for the exam:**

- FX carry traders face a risk profile characterized as a “negative skew”, meaning large losses occur at times of crisis
- Currency markets adjust quickly and the FX carry trade is a leveraged position, which magnify the risk
- Low volatility of spot exchange rates is better for traders with open carry trade positions

**4) Volatility Based Trading**

This style involves establishing a “delta neutral” position hedging the price risk, leaving exposure to option volatility. The delta neutral position is most likely established using forward contracts.

Once the price risk is removed, option strategies such as **straddles** and **strangles** can be used to profit from the outlook on volatility:

<b>Outlook on Volatility</b>	<b>Strategy</b>
Expected increase	Long Straddle or Strangle
Expected decrease	Short Straddle or Strangle

**Adjusting Hedge Ratios With**

- 1) **Forward contracts**
- 2) **FX swaps – “matched” or “mismatched”**

Start with the base case where a 100% hedge ratio is established using forward contracts:

**Static hedge** – set it once and let it drift.

**Dynamic hedge** – adjust the initial setting to changing market conditions using FX swaps.

**Bottom Line:**

In general, it is a cost/benefit trade-off argument as to which hedge you use, static or dynamic. However, watch for signals pointing to “higher risk aversion” of the investor as a signal to use dynamic hedging or “a strong commitment to your belief” as a signal to let the hedge drift!

## **Hedge Decision**

At a given level of “forward points”, the **roll yield** is linked to the cost of establishing the hedge:

The higher the roll yield the higher the cost and the less incentive to hedge

The lower the roll yield the lower the cost and the greater the incentive to hedge

A **risk neutral manger** would not hedge if the net expected value of the hedge is negative (ie. the cost is greater than the benefit)

A **risk averse manager** may hedge even if the net expected value of the hedge is negative!

## **Bottom Line:**

Arrange the quote so that the currency you want to buy is listed as the “Base currency” and the one you want to sell is listed as the “Price currency”, then calculate the forward premium/discount and this will be equal to the “roll yield”.

Compare your percentage change in FX forecast to the roll yield to calculate the net expected value of the hedge.

## **Hedging with Currency Options**

Option contracts allow for downside protection and upside potential, but you must pay for this!

If you are long the “Base currency”, go long a put option on an FX contract quoted as P/B

Trading Strategies to reduce hedging costs and modify risk/return characteristics include over/under hedging with forwards, using out of the money put options, using combinations and spreads.

## **Exposure to Multiple Currencies**

- 1) Cross-hedge – or proxy hedge can be used when currencies are highly correlated
- 2) Macro-hedge – focus on the entire portfolio not just one asset
- 3) Minimum variance hedge – use “Beta” from a regression model to determine the optimal hedge ratio

## **Currency Exposure in Emerging Markets**

May face unique challenges such as higher transaction costs, illiquidity, extreme market events

## Currency Management - Summary

### Carry Trade

“Borrow low yield currencies, invest in high yield currencies”

“Buy currencies trading at a forward discount, sell currencies trading at a forward premium”

### Interest Rate Parity

We know IRP can be stated two ways:

$$F_{H/L} = S_{H/L} \times \left( \frac{1 + i_H}{1 + i_L} \right) \quad \text{or} \quad \% \Delta S_{H/L} \approx (i_H - i_L)$$

Where:

H is the high yield currency

L is the low yield currency

IRP says the high yield currency should depreciate, but in reality high yield currencies often appreciate!

The violation of IRP is known as the **forward rate bias**

### Key point:

The forward premium tends to overstate the appreciation of the BASE currency

The forward discount tends to overstate the depreciation of the BASE currency

**Funding currency** – the low yield currency, usually the lower risk currency

**Investment currency** – the high yield currency, usually the higher risk currency

### Key Point:

During market crisis, “flight to safety” can cause carry traders to be in an unfavorable position

### Currency Options

In the interdealer market, currency options are described in terms of their **delta**, not strike:

“25 delta” means delta of 0.25

“10 delta” means delta of 0.1

	<b>Delta</b>	<b>Cost</b>	<b>Return</b>
In the money	Above 0.5	More expensive	Higher payoff
At the money	0.5		
Out of the money	Below 0.5	Less expensive	Lower payoff

### Delta Hedging and Volatility Trading Strategies

Use straddles and strangles



## Hedging with Forward Contracts

Match the current market value of the foreign currency exposure in the portfolio with an equal and offsetting position in a forward contract.

Use **dynamic hedging** because the market value of the foreign currency asset will change, so the hedge ratio will change

### Rebalancing:

The higher the degree of risk aversion the greater the frequency of rebalancing

The stronger your market view and higher your risk tolerance the lower the frequency of rebalancing

### Tips:

- Know the home currency
- Know the foreign currency in which the assets are denominated
- Make sure the currency quotes are lined up as you need them
- Remember, “selling the price currency is the same as buying the base currency ( $F_{DC/FC}$ )”

#### **For the exam make sure you know this:**

A U.S. Manager is long assets in EUR

To hedge the risk associated with a change in EUR, the manager would:

If the quote is

- 1) USD/EUR      => in this form, the manager would **short the Forward** contract  
                          “*buying the PRICE currency means selling the BASE currency*”
- 2) EUR/USD      => in this form, the manager would go **long the Forward** contract:  
                          “*selling the PRICE currency means buying the BASE currency*”

## FX Swap

You have a hedged position, which most likely consists of being long foreign currency assets and short a forward contract. To roll over the hedge, you buy back the original forward contract, to close your position, and at the same time, sell a new forward contract to extend your hedge for another time period.

### Matched swap

The contract amount is the same for the buy and sell transactions

The “all in” FX rate is the mid-point plus the points

### Mismatched swap

The contract amount is different for the buy and sell transactions

The “all in” FX rate is the bid plus the points

**Hedging Learning Example:**

A Canadian Portfolio Manager holds MEX 10,000,000 foreign currency investments and has sold a MEX 10,000,000 forward contract that is maturing in a few days.

The manager observes the following exchange rate data:

	<b>Spot Rate</b>	<b>Forward Points</b>
MEX/CAD	9.1 / 9.3	150 / 160

1. What would the exchange rate be for the first leg of the swap?
2. What would the exchange rate be for the second leg of the swap?

**Solutions:**

1. The first leg of the swap is to buy back the forward contract to close out the position. Since this is a matched swap, the exchange rate would be the mid-point of the quote:

$$\text{Mid-point} = (9.1 + 9.3) / 2 = 9.2$$

2. The second leg of the swap is to sell the forward contract to re-establish the hedged position. Since this is a matched swap, the exchange rate would be the mid-point of the quote plus the points:

We are selling the MEX, which is the same as buying the CAD....since the CAD is given as the BASE currency we use the ask points:

$$\text{"all in" rate} = \text{Mid-point} + \text{Points} = 9.2 + (160/10000) = 9.216$$

## Roll Yield

If the market is in **contango** and we are given a quote of  $F_{\text{price/Base}}$

The BASE currency is trading at a forward premium

If we need to hedge by buying the BASE currency, then a **negative roll yield** would be produced

If we need to hedge by selling the BASE currency, then a **positive roll yield** would be produced

### Roll Yield Learning Example:

A U.S. Portfolio Manager holds EUR, CAD and MEX denominated assets and is presented with the following data:

**Exhibit 1**

	<b>Roll Yield</b>	<b>Expected Change in the Exchange Rate</b>
USD / EUR	- 4%	- 6%

**Exhibit 2**

	<b>Spot</b>	<b>Forward Points</b>
MEX / USD	10.3 / 10.5	112 / 118

**Exhibit 3**

	<b>Roll Yield</b>	<b>Expected Change in the Exchange Rate</b>
USD / CAD	- 5%	- 3%

The Portfolio Manager decides to hedge against the EUR, but is not sure what to do relative to the CAD or MEX.

1. Evaluate the Portfolio Manager's decision to hedge the EUR:
2. Based only on the data in Exhibit 2, is the roll yield positive or negative for the manager?
3. Should the Portfolio Manager hedge the CAD?

**Solutions:**

1. First off, you must realize that we need to sell the BASE currency in order to hedge.

According to the data in Exhibit 1, the EUR is expected to depreciate by 6%. The roll yield is associated with the cost of hedging, which in this case is 4%, so the manager's decision to hedge is logical.

In other words, the manager would pay 4% to save a 6% currency loss.

2. Realize we need to buy the BASE currency in order to hedge.

The USD is expected to appreciate, so it is trading at a forward premium.

The forward premium tells us the market is in contango and since the manager would be buying the BASE currency at a higher price and selling it at a lower price, so there would be a negative roll yield.

3. Again, realize we need to sell the BASE currency in order to hedge.

According to the data in Exhibit 2, the cost of the hedge is greater than the benefit of hedging, so you might conclude not hedging is appropriate. However, we would need more information to arrive at a complete answer.

A **risk neutral** manager would not hedge under these circumstances, but a **risk averse** manager might hedge.

## Hedging with Options

Using option contracts the portfolio manager achieves downside protection while leaving the potential for upside gains.

### Protective Put

If the manager holds assets denominated in the BASE currency, the manager would buy a put option quoted as **Strike**PRICE/BASE

If the PRICE/BASE quote depreciates, the manager would exercise the put option

IF the PRICE/BASE quote appreciates, the manager would not exercise the put option

### Decision to Hedge: Cost/Benefit

The decision to hedge is based on evaluation of the option premium paid, the potential currency savings and the degree of risk aversion

### Currency Management Strategies

1. If you think the currency is going to depreciate a lot, then **over hedge** using forward contracts
2. If you think the currency is going to appreciate a lot, then **under hedge** using forward contracts
3. If you think the currency is going to depreciate, then increase the **hedge ratio**
4. If you think the currency is going to appreciate, then decrease the **hedge ratio**
5. Accept some downside risk by using **out of the money** put options
6. Creating a **collar**, which entails buying a put and selling a call (**short risk reversal** position)
7. **Risk reversal**, which entails, buying a call and selling a put

### Hedging Multiple Currencies

Cross hedging or proxy hedging may be required

The currency hedge must incorporate the correlation between the various currencies held in the portfolio:

$$\sigma_1 = (1 + RF_1)(\text{Currency Risk}_1)$$

$$\sigma_2 = (1 + RF_2)(\text{Currency Risk}_2)$$

$$\sigma^2(R_{DC}) = (w_1^2)(\sigma_1^2) + (w_2^2)(\sigma_2^2) + (2)(w_1)(w_2)(\sigma_1)(\sigma_2)(\rho_{1,2})$$

### Bottom Line:

Currency correlation and portfolio weightings affect the overall currency risk

### Minimum Variance Hedge Ratio

Using regression we can find the optimal cross hedging ratio:

$$R_{DC} = a + B (\% \Delta S_{DC/FC}) + e$$

Where: B is the minimum variance hedge ratio

**Be aware**, we could calculate the “Beta” using correlation and standard deviation (just like you did in Level 1!):

$$\text{Minimum Variance Hedge Ratio} = B = \rho(R_{DC}, R_{FX}) \times \left( \frac{\sigma R_{DC}}{\sigma R_{FX}} \right) \leftarrow \text{this is the } \% \Delta S_{DC/FC}$$

**Hedging Learning Example:**

Bill Samarit is a U.S. Portfolio Manager. His Global Equity Fund holds assets denominated in Euros, Canadian Dollars and British Pounds.

Samarit’s outlook for the Canadian Dollar is negative based on his expectation of slower growth in the Canadian economy.

Next, Samrit’s associate gathers the following data:

**Table 1**

$\sigma(R_{FX})$	10%
$\sigma(R_{USD})$	12%
$\rho(R_{USD}, R_{FX})$	0.3
<b>Note:</b> $R_{FX}$ is quoted as USD/EUR	

Using regression, Samrit formulates the following equation for the USD and GBP:

$$R_{USD} = 1.3 + 2.55 (\% \Delta S_{USD/GBP}) + e \quad \text{[equation 3]}$$

1. Given Samarit’s outlook for the Canadian Dollar, what would be the most appropriate hedging transaction assuming the quotation is:
  - a) CAD/USD
  - b) USD/CAD
2. Assume the portfolio holds EUR 50,000,000 in assets. Using the data in Table 1, construct the minimum variance hedge:
3. Using equation 3, calculate the minimum variance hedge ratio for Samrit’s exposure to the GBP:
4. Assume the currency pair is quoted as GBP/USD. Using equation 3 and assuming the portfolio has exposure to GBP 2,000,000, outline the correct hedging strategy:

**Solutions:**

1. a) He should go long a forward contract if it is quoted as CAD/USD  
b) He should short a forward contract if it is quoted as USD/CAD

Remember, you are buying and selling the BASE currency!

On the exam look for basic macroeconomic data to use as you signals to judge the outlook for the currency:

Factor	Effect on the Currency
Increase interest rates	Positive
Decrease interest rates	Negative
Higher inflation	Negative
Lower inflation	Positive
Higher exports	Positive
Lower exports	Negative
Stronger economy	Positive
Weaker economy	Negative

**Other Signals:**

If the spot rate is below the moving average, this indicates resistance at the moving average rate.

If the spot rate is above the moving average, this indicates a support level at the moving average rate.

$$2. \text{ Minimum Variance Hedge Ratio} = B = \rho(R_{DC}, R_{FX}) \times \left( \frac{\sigma_{R_{DCBU}}}{\sigma_{R_{FX}}} \right) = 0.3 \times \left( \frac{12}{10} \right) = 0.36$$

The manager needs to short  $0.36 \times \text{EUR } 50,000,000 = \text{EUR } 18,000,000$  forward.

Stated more formally, the manager should short a USD/EUR Forward contract with a notional size of EUR 18,000,000

3. The minimum variance hedge ratio should be set at 255%
4. The long GBP 2,000,000 exposure should be hedged with a short position in GBP against the USD in the amount of  $2.55 \times \text{GBP } 2,000,000 = \text{GBP } 5,100,000$ .

Because the currency quote is given as GBP/USD, the manager should take a long position....did you write a short position?....hold on before you go crazy....remember going long means buying the BASE currency and selling the PRICE currency!

## Market Indexes and Benchmarks

### Benchmarks vs. Indexes

Benchmarks reflect the manager's style while market indexes may not.

**Valid benchmarks** will be unambiguous, investable, measurable, appropriate, reflective of current investment opinions, specified in advance, and accountable("owned")

### Uses of benchmarks

In general, benchmarks are used to evaluate portfolio performance and to evaluate investment managers in terms of their skill.

### The text identifies the following uses:

1. reference points for segments of the sponsor's portfolio
2. communication of instructions to the manager
3. communication of instructions to a board of directors (or any oversight group) and consultants
4. identification and evaluation of the current portfolio's risk exposures
5. interpretation of past performance and performance attribution
6. manager appraisal and selection
7. marketing of investment products
8. demonstration of compliance with regulations, laws, or standards

### Types of Benchmarks

An **absolute return benchmark** is simply a minimum target return that the manager is expected to beat.

A **manager universe** (or **manager peer group**) is a broad group of managers with similar investment disciplines. Manager universe benchmarks allow investors to make comparisons with the performance of other managers.

**Broad market indexes** are well known measures of broad asset class performance.

**Style indexes** represent specific investment styles within asset classes.

**Factor-model-based benchmarks** are constructed by examining the portfolio's sensitivity to a set of factors, such as the index return, company earnings growth, industry, and financial leverage.

**Returns-based benchmarks (Sharpe style analysis)** are similar to factor-model-based benchmarks where the factors are the returns for various style indexes (e.g., small-cap value, small-cap growth, large-cap value, and large-cap growth).

**Custom security-based benchmarks** (or strategy benchmarks) are built to accurately reflect the investment discipline of a particular investment manager. The benchmark is constructed by selecting securities and weightings consistent with the investment manager's process and client restrictions.

## **Liability-based Benchmarks vs. Asset-based Benchmarks (LINK: SS6)**

- Assets are chosen for their ability to fund the payment of liabilities with relatively low risk. A liability-based benchmark typically consists of nominal bonds, real return bonds, common shares, and other assets.
- Unlike market indexes in which the components' weights typically reflect relative overall market values, in a liability-based benchmark component weights are determined based on the requirement that the benchmark closely track returns to the liabilities.
- Investment success relative to such a benchmark is linked with achieving the objective of funding liabilities; by contrast outperformance of a market index used as a benchmark would not imply anything about the portfolio's ability to fund liabilities.
- In a liability-based benchmark, the benchmark is structured to accurately reflect the return required to meet the future obligations as well as mimic the volatility of the liabilities.

## **Uses of Market Indexes**

1. Asset allocation proxies
2. Investment management mandates
3. Performance benchmarks
4. Portfolio analysis applications
5. A gauge of market sentiment

## **Constructing Market Indexes - Tradeoffs**

### **1) Completeness vs. investability**

Including all securities would be ideal, but many securities are difficult to trade due to lack of liquidity. Index designers must decide how broad their indexes can be while maintaining adequate investability.

### **2) Reconstitution and rebalancing frequency vs. turnover**

Reconstitution refers to the process of adding and dropping securities from an index and rebalancing refers to a readjustment in the weights of existing securities.

Frequent reconstitution and rebalancing is desirable in order to improve representativeness of the index, however all transactions have a cost. Thus, there is a conflict between representativeness and low turnover.

### **3) Objective and transparent rules vs. judgment**

Transparency and objectivity are desirable characteristics of indexes because this information enables investors to anticipate changes and trade accordingly, instead of reacting to them. Less transparency and the greater use of judgment by the index provider make it harder for investors to determine the constituents of an index and anticipate changes in it, making the index less investable and creating additional costs for tracking portfolios.

## Advantages and Disadvantages of Index Weighting Schemes

### 1. Price weighted

- Arithmetic average of current prices – simple to calculate
- Assumes you purchase an equal number shares of each stock represented in the index
- Examples include: DJIA and Nikkei-Dow Jones Average
- PWI do not necessarily reflect the economic importance of issuing companies.
- Successful companies will become underrepresented, creating a downward bias in the index return.

### 2. Market Cap Value Weighted

- The current market value (number of shares outstanding x current market price) is compared to an initial base market value
- Assumes you make a proportionate market value investment in each company in the index
- Examples include: S&P 500 Composite, Wilshire 5000 Equity Value, Morgan Stanley Capital International, Financial Times-Actuaries World
- Major Problem: as Market capitalization increases, stock's impact on index increases
- A cap-weighted index is thus the best representation of a typical investor's opportunity set. As a result, a capitalization-weighted index is superior at succinctly representing the effect of changes in a market's total value and investors' total wealth.

### 3. Equal Weighted

- Unweighted index, all stocks carry equal weight regardless of their price and/or their market value.
- Assumed the investor makes an equal dollar investment in each stock in the index
- Generally based on the arithmetic or geometric mean of the holding period returns.
- Examples include: Value Line Composite, Financial Times Ordinary Share Index
- All stocks treated equally in terms of weighting (small cap bias), requires frequent rebalancing, which can lead to higher tracking error and higher transaction costs

### 4. Fundamental Weighting

- Uses company characteristics such as sales or cash flow to weight securities.
- The performance of a fundamental-weighted index represents the performance of a portfolio that invests according to valuation metrics for a security.
- Overcomes the drawbacks associated with cap weighted index.
- A disadvantage of fundamental-weighted indexes is that they reflect the index creator's view of valuation, which may or may not be correct.
- These indexes may not serve as valid benchmarks because their composition and weightings are not fully known.

## **Selection of a Benchmark**

The text does not address this directly, but the bottom line is the benchmark must be valid and most importantly....must reflect the style of the manager!

The text also notes that if a market index is to be used as a benchmark, a capitalization-weighted, float-adjusted index would likely be the best benchmark for most managers....so if you had to choose a market index as a benchmark you could default to this type.

## **Recap: Properties of a valid benchmark**

- 1) measurable
- 2) unambiguous
- 3) specified in advance
- 4) investable
- 5) managers would also be familiar with and have an opinion on index securities.
- 6) reflect the same style of the manager

Market indexes do not capture a manager's investment process, a custom benchmark is often constructed.