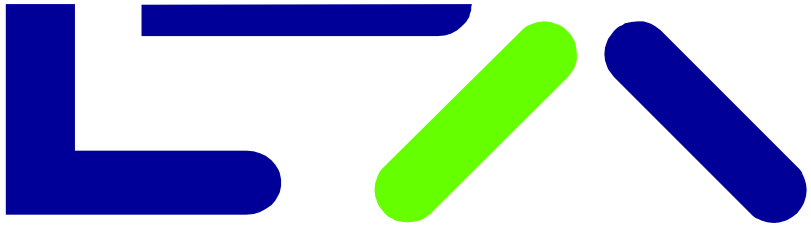
X-pand into the Future



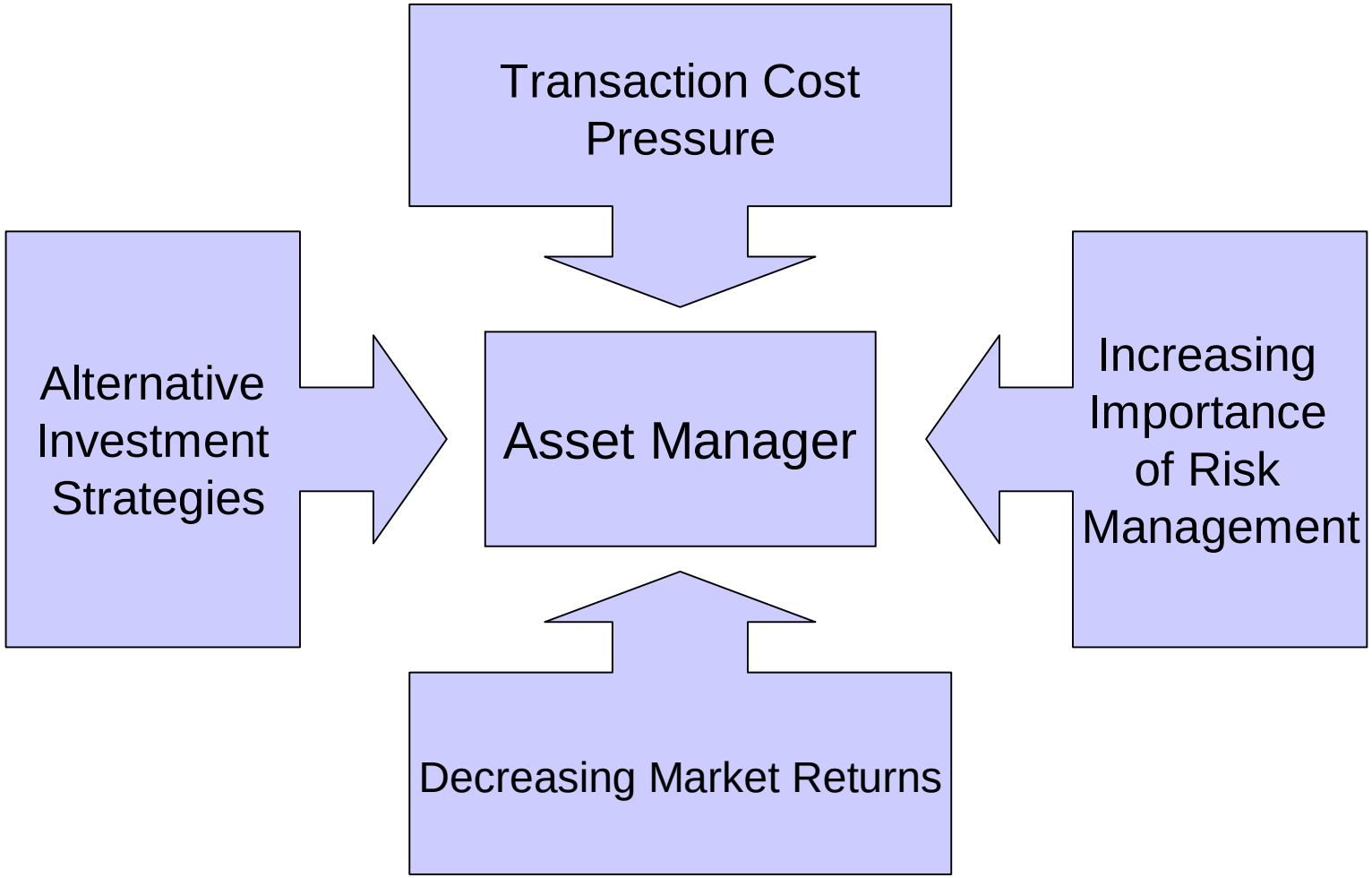
Derivatives Evolution 2007

Mini Workshop & Case Studies: Fixed Income Futures in Fund Management

Sheraton Towers Hotel

Singapore, 27 June 2007

Trends in the Fund Management Industry



Derivatives supply solutions to trends in Fund Management industry

Pressure on decreasing transaction costs

- Futures / options have lower commissions and market impacts as well as tight bid-ask spreads

Decreasing market returns

- Fast, efficient and short-term market sector exposure using futures / options

Increasing importance of risk management

- Futures / Options enable accurate management of risk exposure

Increase in the use of alternative investment strategies

- Futures / Options allow fast exposure adjustments, greater leverage, and are easier to sell short

Fixed Income Futures in Fund Management

- Cash Equitisation
- Adjusting Portfolio Duration
- Assisting Portfolio TAA - **Portfolio Overlay**
- Using Fixed Income Futures as a synthetic cash market instrument - **Duration Targeting**
- Using Fixed Income Futures as a synthetic cash market instrument - **Bond Picking**
- Yield Curve, Synthetic Bond Spreads & Relative Value Strategies - **Generating Alpha**
- Fixed Income Futures Calendar Rolls – Improving Strategy Efficiency
- iTraxx® Credit Futures – the worlds first exchange traded credit derivative
- Using Fixed Income Futures in Portable Alpha Investing

Global Bond Futures Contracts – FT.com

FT.com Data available at www.ft.com/marketsdata

BOND FUTURES

May 16		Open	Close	Change	High	Low	Est. vol	Open int.
Euro-Eurex	Jun	113.03	112.97	+0.03	113.08	112.84	1350,584	1793,913
	Sep	112.97	112.96	+0.03	113.04	112.84	7,924	42,255
Japan 10yr-TSE	Jun	134.06	134.08	+0.17	134.09	134.05	29,891	140,061
US Tr long-CBOT	Jun	110-28	110-30	+0-02	111-06	110-24	266,281	847,631
	Sep	111-02	110-31	+0-02	111-06	110-26	26,626	84,219
US Tr 10yr-CBOT	Jun	107-230	107-220	-	107-280	107-200	980,669	2675,431
	Sep	107-260	107-240	+0-005	108-040	107-220	54,728	254,824
Euro-Bobl-Eurex	Jun	107.18	107.11	-0.02	107.20	107.05	705,372	1423,101
	Sep	107.26	107.23	-0.02	107.28	107.21	3,343	24,158
Euro-Schatz-Eurex	Jun	102.950	102.905	-0.025	102.955	102.885	737,716	1788,315
	Sep	102.890	102.840	-0.030	102.890	102.820	17,966	62,210
US Tr 5 yr-CBOT	Jun	105-100	105-095	-	105-140	105-075	408,249	1656,535
	Sep	105-175	105-140	-	105-180	105-125	10,922	115,920
Long gilt-Liffe	Jun	106.49	106.51	+0.07	106.64	106.38	61,077	408,796
	Sep	-	106.52	+0.07	-	-	-	5
SFE 3 yr	Jun	93.87	93.87	+0.04	93.88	93.86	15,890	768,271
Kofex 3 yr	Jun	107.92	107.90	-0.02	107.96	107.88	32,759	195,156

Contracts shown are among the most heavily traded in 2004. Open interest figures and are for the previous day. CBOT volume, high & low for pit & electronic trading at settlement. For more contract details see: www.eurexchange.com,cbot.com, tse.or.jp, liffe.com. Changes based on prev sett price. US data in 32nds.
Source: Reuters.

Eurex European Benchmark Fixed Income Futures

	Euro Schatz (FGBS)	Euro Bobl (FGBM)	Euro Bund (FGBL)	Euro-Buxl (FGBX)
Contract Standard	Notional government bond issued by the FRG with **1.75-2.25 years to maturity** and a (notional) 6% coupon	Notional government bond issued by the FRG with **4.5-5.5 years to maturity** and a (notional) 6% coupon	Notional government bond issued by the FRG with **8.5-10.5 years to maturity** and a (notional) 6% coupon	Notional government bond issued by the FRG with **24 - 35 years to maturity** and a (notional) 4% coupon
Delivery	Sellers obligation to deliver and the right to choose which security to deliver from the basket			
Price Quotation	In percent of par with three decimal places	In percent of par with two decimal places		
Minimum Price Change	0.005 per cent equivalent to Euro 5	0.01 per cent equivalent to Euro 10		0.02 per cent equivalent to Euro 20
Delivery Day	Tenth calendar day of the delivery month			
Contract Months	March, June, September and December			
Last Trading Day	Two exchange trading days prior to Delivery Day			
Trading Hours	*08:00 - 22:00 CET*			

Eurex European Benchmark Fixed Income Futures – June 2007 Delivery

Contract	Deliverable Bonds	Conversion Factor
Euro Schatz		
	BKO 3.75% 03/09	0.963364
	OBL 3.25% 09 #144	0.953049
	DBR 4.5% 07/09	0.971606
	DBR 4% 07/09	0.962175
Euro Bobl		
	DBR 5% 01/12	0.960701
	OBL 4% 04/12 #150	0.917874
	DBR 5% 07/12	0.957333
Euro Bund		
	DBR 3.5% 01/16	0.836007
	DBR 4% 07/16	0.863155
	DBR 3.75% 01/17	0.839319
	DBR 4.25% 07/17	0.870404
Euro Buxl®		
	DBR 4% 01/37	0.999808
	DBR 4.75% 07/34	1.122577

Eurex Swiss Government Bond Future

Contract Standard	Notional government bond issued by the Swiss Confederation with **8-13 years to maturity** and a notional 6% coupon
Delivery	Sellers obligation to deliver and the right to choose which security to deliver from the basket
Price Quotation	In percent of par with two decimal places
Minimum Price Change	0.01 per cent, equivalent to a value of CHF10
Delivery Day	Tenth calendar day of the delivery month
Contract Months	March, June, September and December
Last Trading Day	Two exchange trading days prior to delivery day. Trading shall end at 12:30 CET on the last trading day
Trading Hours	*08:30-17:00 CET*

Debt Futures and Delivery

- At delivery the short futures position holder has the obligation to deliver and the right to choose which bond to deliver.
- A small proportion of contracts go to delivery with the majority of contracts closed out before delivery or rolled into the next delivery month.
- The potential for physical delivery generates the close correlation between the cash bond market and fixed income futures thereby offering a powerful tool for hedging and debt portfolio management.

Determination of Cheapest to Deliver Bond

Duration, relative bond prices and yield levels determine which bond functions as the cheapest-to-deliver (CTD) bond:

- If the market yield is **above the notional yield** of the futures contract, the bond with the **longest duration** (low coupon/long maturity)will tend to be CTD;

- If the market yield is **below the notional yield** of the futures contract, the bond with the **shortest duration** (high coupon/short maturity)will tend to be CTD;

- If the market yield is **at the notional yield** of the futures contract, there will be **no obvious preference for CTD status**.

Important Equation to remember.....

BPV Bond Future = BPV CTD Bond / CFctd

(BPV = Basis Point Value i.e. value of an .01 change in yield)

Derivation of Fixed Income Futures Hedge Ratio

When hedging a bond exposure with fixed income futures the fund manager is trying to equate a movement in fixed income futures to a movement in the underlying bond investment.

Therefore, the Hedge Ratio = dC / dF

where dC = change in bond and dF = change in fixed income future.

It is assumed, because of cash and carry arbitrage, fixed income futures will track the cheapest- to-deliver bond that is, dF = dCTD / CFctd

where dCTD = change in the cheapest-to-deliver bond; and
CFctd = conversion factor of the cheapest-to-deliver bond.

Substituting, Hedge Ratio = dC / dCTD * CFctd.

Therefore, for small changes in yield:

Hedge Ratio = BPV Bond to be hedged / BPV CTD * CFctd.

(where BPV = Price change of an .01 change in yield)

Number of bond futures to hedge a bond holding = VBPV Exposure / VBPV CTD Bond * CFctd

(where VBPV is monetary value of .01 change in yield)

When hedging the CTD the Hedge Ratio becomes the CFctd and the number of bond futures is determined by: (Nominal Exposure / Nominal Size of Bond Future) * CFctd

Cash Equitisation - Hedging a future investment in European fixed income assets

Situation:

A fund manager anticipates receiving €50 million new investment funds in a weeks time and plans to buy the DBR 4.5% July 2016 bond. The fund manager is worried that bond prices will be higher by then. The fund manager buys Euro-Bund Futures to forward–fix / hedge the cost of the future bond investment.

Solution:

- June Euro-Bund Futures CTD is currently DBR 3.5% January 2016
- CTD has a conversion factor of 0.836007
- VBPV of DBR 4.5% July 2016 is €40,250 per €50,000,000 nominal
- VBPV of DBR 3.5% January 2016 is €67.20 per €100,000 nominal

Therefore, the number of Euro-Bund Futures contracts to buy to forward-fix / hedge a €50 million future investment in DBR 4.5% July 2016 is €40,250 / €67.20 * 0.836007 = 500.74 ~ 501 contracts.

Adjusting Portfolio Duration with Fixed Income Futures

Situation:

A fund manager has a €50 million government bond portfolio and decides to increase portfolio (modified) duration from 4.3 to 7.9.

The alternatives facing the fund manager are either to switch out of the current bond holdings to longer duration bonds OR to overlay the current bond holding with fixed income futures contracts.

Adjusting Portfolio Duration with Fixed Income Futures - Solution

- First, calculate the BPV of the current portfolio:

Current Portfolio BPV = Portfolio Modified Duration * Portfolio Value * 0.0001 = 4.3 * €50,000,000 * 0.0001 = €21,500.

- Second, calculate Portfolio BPV with the higher portfolio duration target:

Target Portfolio BPV = 7.9 * €50,000,000 * 0.0001 = €39,500.

- Finally, calculate the appropriate number of fixed income futures contracts to reach the target portfolio duration:

Number of Fixed Income Futures to adjust Portfolio Duration =

Target Portfolio BPV – (Current Portfolio BPV) / (BPV Euro Bund future) where BPV Euro Bund future = BPVctd / CFctd.

(The Euro Bund future VBPV = €68.3 / 0.836007 = €81.69).

Therefore, the number of Euro Bund futures to overlay the bond portfolio to increase portfolio duration from 4.3 to 7.9 = €18,000 / €81.69 = 220.34 ~ 220 Euro-Bund futures contracts.

Advantages of using Fixed Income Futures in adjusting Portfolio Duration

- No disruption to the existing Bond Portfolio when fixed income futures are overlaid with the existing investments.
- Smaller capital outlay.
- Attractive if fixed income futures are particularly ‘cheap’ to cash.

Assisting Portfolio TAA / Portfolio Overlay

Situation:

A European government bond portfolio manager has a €50 million holding in medium term European benchmark government bonds i.e. DBR 3.5% 2016 (CTD of June Euro-Bund future) and has decided to switch the investment into Swiss government bonds of similar duration and maturity.

The fund manager can **EITHER** liquidate his holding in European government bonds and buy similar duration and maturity Swiss government bonds **OR** overlay a Short Euro-Bund Future / Long CONF future position to the existing portfolio. The CTD of the June CONF future is the SWISS 2.5% 2016 bond.

Assisting Portfolio TAA / Portfolio Overlay

Solution:

First, calculate the number of Euro-Bund futures to neutralise the €50 nominal holding of DBR 3.5% 2016:

€50 million / €100,000 * 0.836007 ~ 418 Euro-Bund futures

Second, calculate the duration weighted ratio for Euro-Bund futures to Swiss CONF futures i.e. BPV Euro-Bund future: BPV CONF future:

With BPV of Euro-Bund future equal to 0.08169 (or 8.169 futures ticks which is worth €81.69) and the BPV of the CONF future equal to 0.0985 (or 9.85 futures ticks which is worth CHF98.5) and a €/CHF exchange rate of 1.65587, gives a ratio of **1 Euro-Bund future : 1.37 CONF futures**.

Assisting Portfolio TAA / Portfolio Overlay

Finally, based on a duration weighted Euro-Bund:CONF ratio of 1:1.37, the portfolio manager calculates how many CONF futures to buy against a short 425 Euro-Bund futures position i.e. 418 x 1.37.

Therefore, the fund manager ***sells 425 Euro-Bund futures and buys 573 CONF futures*** as a ***portfolio overlay strategy*** to synthetically create an asset allocation switch from European government bonds to Swiss government bonds. The existing portfolio of European government bonds have been left intact.

Using fixed income futures as a synthetic cash instrument – Duration Targeting

Situation:

A fund manager has €25 million to invest and wants to achieve a specific portfolio modified duration target of 20.

Solution:

The number of Euro-Buxl® Futures contracts to buy to create a €25 million nominal synthetic fixed income investment with a specific modified duration of 20 is determined by the following formula:

Target Duration * Investment * 0.0001 / VBPV Euro-Buxl® Futures

(VBPV Euro-Buxl® Futures = VBPV CTD / CF ctd = €154.2 / 0.999808 = €154.23)

= (20 * €25million * 0.0001) / (€154.23) = 320.14 ~ 324 Euro-Buxl® Futures contracts.

Using Eurex Fixed Income Futures as a synthetic investment - 2

Situation:

A fund manager considers a newly issued Euro Bond ‘cheap’ to benchmark European government bonds.

Solution:

The fund manager buys the Euro Bond issue and sells the appropriate number of Eurex fixed income futures to create the synthetic short in Euro Bunds to trade the interest rate spread between European government and corporate bonds. This strategy is particularly attractive the closer the benchmark Bund is to the CTD of the futures contract.

Yield Curve, Synthetic Bond Spreads & Relative Value Strategies

- Yield Curve
- Synthetic Bond Spreads
- Relative Value

Eurex Euro-Schatz-Euro-Buxl® Yield Curve Spread

Situation:

A fund manager expects the European yield curve between short-dated and long-dated maturities to flatten. Currently, the CTD for the Eurex June Euro-Schatz futures is the BKO 3.75% March 2009 and the CTD for the Eurex June Euro-Buxl® Futures is the DBR 4.0% January 2037.

The fund manager decides to express the view of the European yield curve to flatten by intiating a position in the Eurex EuroSchatz-Euro-Buxl® yield curve spread i.e. *sell Euro-Schatz futures and buy Euro-Buxl® futures*.

Eurex Euro-Schatz-Euro-Buxl® Yield Curve Spread

Solution:

- CTD for the June Euro-Schatz Futures contract is BKO 3.75% December 2009; conversion factor is 0.963364 and VBPV is €16.9 per €100,000 nominal.

- CTD for the December Euro-Buxl® Futures is DBR 4.0% 2037; conversion factor is 0.999808 and VBPV is €154.2 per €100,000 nominal.

- VBPV Euro-Schatz Futures contract is €16.9 / 0.963364 = €17.54

- VBPV Euro-Buxl® Futures contract is €154.2 / 0.999808 = €154.23

Therefore, the VBPV weighted ratio to establish a European yield curve position using the Eurex Euro-Schatz Futures contract and Euro-Buxl® Futures contract is:

8.79 Euro-Schatz Futures contracts : 1 Euro-Buxl® Futures contract.

Synthetic Bond Spread Strategy

Situation:

A fund manager has the view that in the short to medium term that Swiss government bonds will outperform European benchmark government bonds. The fund manager can **EITHER** buy Swiss government bonds and short European government bonds of equal duration and maturity **OR** buy Swiss CONF futures and sell Euro-Buxl futures, duration weighted.

Synthetic Bond Spread Strategy

Solution:

The CTD for the Swiss CONF future is the Swiss 2.5% 2016 and for the Euro-Bund future, the DBR 3.5% 2016. The BPV of the CONF future is 0.0985 or 9.85 futures ticks which has a value of CHF98.5 The BPV of the Euro-Bund future is 0.08169 or 8.169 futures ticks which is worth €81.69. The €/CHF exchange rate is currently 1.65587.

Therefore, on a duration weighted basis, the fund manager establishes a *long CONF future / short Euro-Bund future* position on a ***1 Euro-Bund futures : 1.37 CONF futures ratio***.

Eurex Euro- Schatz/Euro-Bund/Euro-Buxl® Barbell

Situation:

A fund manager believes that the short-dated and long-dated maturity sectors of the European government bond yield curve will outperform the medium maturity sector. The fund manager decides to structure a Barbell position using the Eurex Euro-Schatz, Euro-Bund and Euro-Buxl® Futures contracts.

Solution:

- VBPV Euro-Schatz Futures is €17.54 (i.e. BPVctd / CFctd i.e. €16.9 / 0.963364)

- CTD of Euro-Bund Futures is DBR 3.5% 2016; conversion factor is 0.836007 and the VBPV is €68.3 per €100,000 nominal

- VBPV Euro-Bund Futures is €68.3 / 0.836007 = €81.69

- VBPV Euro-Buxl Futures is €154.22

Therefore, the fund manager intiates a Barbell structure in the following ratio:

8.79 Euro-Schatz Futures contracts : 3.78 Euro-Bund Futures contracts : 1 Euro-Buxl® Futures contract

Fixed Income Futures Calendar Rolls – Improving Strategy Efficiency

Changes in the *spread* between between the two futures delivery months of the debt futures contract will affect the effective performance of the futures strategy.

Factors affecting a debt futures calendar roll (spread):

- Repo rate of CTD bonds to each deliverable month;
- Closeness of deliverable bonds;
- CTD in each deliverable month – duration and maturity differences will give a ***market direction bias*** to the roll / spread.

Debt Futures Calendar Rolls

Contract Spread	*CTDs*	*BPV Future*
Euro-Schatz®	BKO 3.75% 03/09 - DBR 4.5% 07/09	0.017 – 0.020
Euro-Bobl®	DBR 5% 01/12 - OBL 4% 04/12	0.043 – 0.046
Euro-Bund®	DBR 3.5% 01/16 – DBR 4% 07/16	0.080 – 0.083
Euro-Buxl®	DBR 4% 01/37 - DBR 4% 01/37	0.1490 – 0.1490

Using Fixed Income Futures in Portable Alpha Investment Structures

Portable Alpha Investing…….

Portable Alpha enables Fund Management to separate market (Beta) investment to investments that produce above market returns (Alpha). Alpha investment strategies are referred to as *portable* because they are selected from a wide range of assets regardless of the selected benchmark with the excess returns *ported* to the benchmark investment portfolio.

Portable Alpha revisted

Traditional long only Portfolio Management

Portfolio Return = ∑ Overweight and Underweight positions in the Benchmark Assets

Portable Alpha Portfolio Management

Portfolio Return = Benchmark/Beta Return + ∑ Alpha Returns

Seperating Beta and Alpha Returns

Construction of a Portable Alpha Investment Portfolio:

Establish market exposure in Benchmark – Futures only need a fraction of money to establish an equivalent position in the cash market e.g. the Eurex EURO Stoxx50® stock index of European blue chip stocks requires an initial margin requirement of only €3,285 per contract (current value of €44,890) to establish a position.

Alocate funds to alpha investments - Funds allocated to a broad range of assets that are *uncorrelated* to beta/market investment and to other alpha investments to produce highest portfolio return. Market exposure of alpha investment hedged out through the use of futures – ***alpha purification***.

Seperating Beta and Alpha Returns

Case Study - Portable Investment Strategy

Situation – An institutional investor is benchmarked to European government bonds and sees the potential of a European equity fund manager producing high returns. However, the investor does not want European equity market exposure and wants to isolate the alpha returns of the equity manager.

Seperating Beta and Alpha Returns

Portable Alpha Investment Strategy - Solution

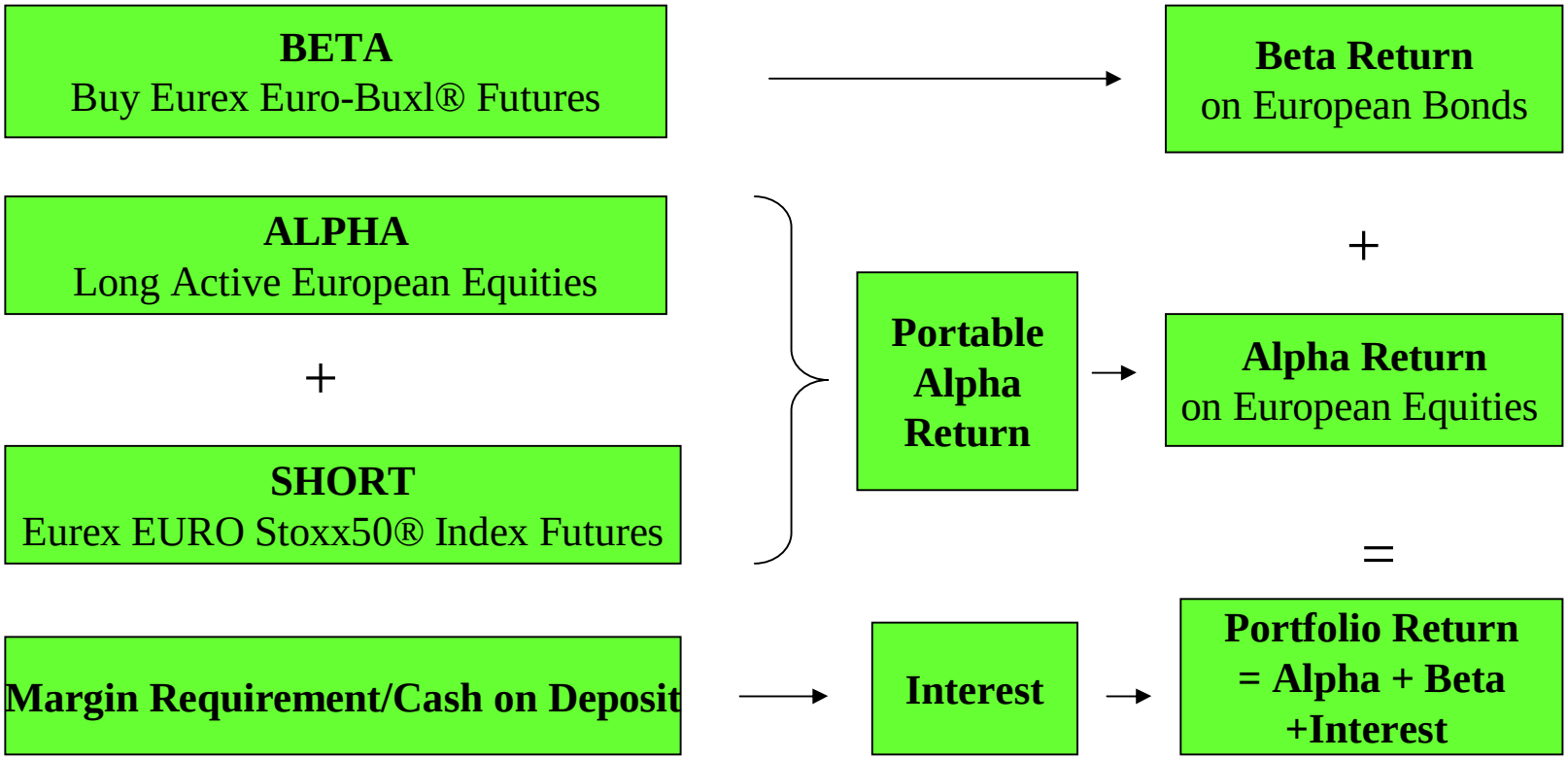
Solution –

- Establish beta/market exposure in Benchmark European government bonds by buying Eurex Euro-Buxl® Futures.

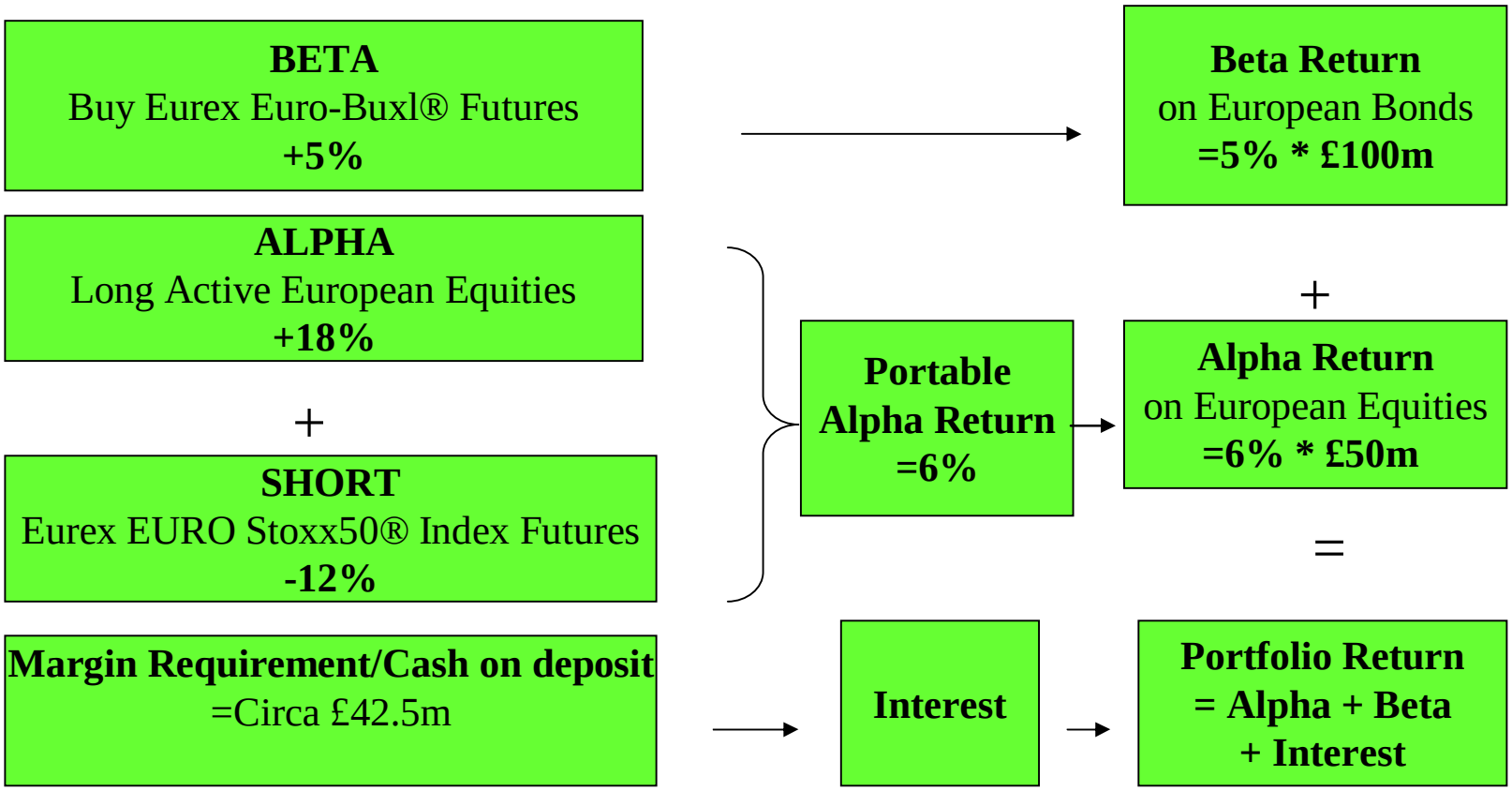
- Alocate funds to the European equity fund manager and use Eurex EURO Stoxx50® index futures contracts to isolate the alpha returns produced by the fund manager.

Seperating Beta and Alpha Returns

Portable Alpha Investment Strategy – Example



Seperating Beta and Alpha Returns Example - Continued



Futures versus Swaps as Alpha-Beta Separator

As an alternative to Futures, Total Return Swaps (TRS) can be used as the mechanism by which to separate the alpha and beta portfolio returns in a Portable Alpha Investment Strategy.

Futures offers specific benefits over TRS:

- Price Transparency
- Daily independent mark-to-market valuation
- Central counterparty clearing house substantially reducing credit risk

Factors for a successful Portable Alpha Investment Strategy

Beta Management – Ability to create beta/benchmarket exposure and isolate alpha returns quickly and cheaply. The ***liquidity*** of the futures contracts used is the cornerstone of a successful portable alpha investment strategy. Futures provide a very cheap way of obtaining beta / benchmark exposure.

Futures positions entail daily cash flows. There is a definite need under a Portable Alpha Investment strategy to have a structure in place to manage those cash flows.

Factors for a successful Portable Alpha Investment Strategy - Continued

Alpha Management - Establish alpha investments in asset classes that are *uncorrelated* to the market/beta investment or with other alpha investments in the portfolio.

Alpha is not leverage or increased / decreased benchmark exposure.

Factors for a successful Portable Alpha Investment Strategy - Continued

Tracking Error and Roll Risk Minimisation – Futures are used to obtain beta/market exposure and to replicate the benchmark. The *closer* the relationship between the futures contract and the investors benchmark, the lower the *tracking error.* Futures contracts are, usually, for quarterly delivery months. To maintain the beta/market exposure as delivery approaches, the futures position will need to be rolled i.e. transferred from one delivery month to the next.

Changes in the *spread* between between the two futures delivery months will affect the effective performance of the benchmark/beta investment.

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Eurex Web Site

The Eurex web site has a number of articles, publications and academic papers for Institutional Investors including information on the new iTraxx® CDS Futures contracts:

http://www.eurexchange.com/documents/publications/publications_en.html

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