

Bundled Linear Combinations of Financial Instruments

f_{subtitle}

Frank Shi

The background of the top section is a blurred financial chart. It features a candlestick chart with orange and green bars, overlaid with a white line graph and a dashed blue trend line. A numerical value '+11,00,00' is visible in the upper left of the chart area.

Contents

1	Basic Definitions	5
1.1	Baskets	5
1.2	Subscription and Redemption	6
2	Pricing	7
2.1	Useful Values	7
3	Hedging	9
3.1	Proxy	9
3.2	Fixed Income	9
	Index	11

1. Basic Definitions

1.1 Baskets

Remark 1.1.1 Prices and definitions in general are static data, i.e. assume that we fix a point in time during all subsequent discussions.

Moreover, the set of natural numbers \mathbb{N} consists of integers greater or equal to 1, i.e.

$$\mathbb{N} = \{1, 2, \dots\},$$

and the set of positive real numbers is $\mathbb{R}^+ := \mathbb{R} \setminus \{0\}$,

Definition 1.1.2 Fix a currency C_B , a **financial instrument** I with respect to C_B is a 2-tuple

$$(P_t, F_t)$$

where $P_t \in \mathbb{R}^+$ is a random variable that represents the price of the instrument at time t and $F_t \in \mathbb{R}^+$ is such that $P_t F_t$ represents the price of the instrument in C_B at time t .

The currency C_B is known as the **base currency**.

Definition 1.1.3 A financial instrument I for which $P_t = 1$ for all t is a **cash instrument**. Any financial instrument that is not a cash instrument is a **non-cash instrument**.

Definition 1.1.4 Fix a currency C_B , a **non-cash basket** of size n is a finite set of non-cash instruments

$$\{I_1 := (P_t^1, F_t^1), \dots, I_n := (P_t^n, F_t^n)\}$$

coupled with a vector $a := [a_1, \dots, a_n]^T \in \mathbb{R}^n$ where each $a_i \in \mathbb{R}$ represents the amount of I_i held in the basket, $P_t^i \in \mathbb{R}^+$ represents the price of I_i at time t , and $F_t^i \in \mathbb{R}^+$ is such that $P_t^i F_t^i$ represents the price of I_i in currency C_B at time t .

A **cash basket** of size m is a finite set of cash instruments

$$\{C_1 := (1, F_t^1), \dots, C_m := (1, F_t^m)\}$$

coupled with a vector $q := [q_1, \dots, q_m]^T \in \mathbb{R}^n$ where each $q_i \in \mathbb{R}$.

Remark 1.1.5 Whenever a market instrument or a cash instrument is discussed, it is always with respect to a base currency C_B . This is because the instruments in general might be in many different currencies, commonly referred to as **local currencies**. Due to reasons beyond the scope of this note, given two local currencies C_1 and C_2 , it is in general not true that 1 C_1 can buy the same amount of things as 1 C_2 . Because of this, to compare the prices of two instruments in different currencies fairly, we need to convert their local currencies into the same currency. That currency we convert to is the base currency C_B .

Definition 1.1.6 A **bundle** is a 2-tuple

$$(M, C)$$

where M is a market basket and C is a cash basket such that M and C share the same base currency C_B .

1.2 Subscription and Redemption

Definition 1.2.1 Someone who defines a specific instance of a bundle by specifying the vectors a and q and the corresponding instruments I_i and C_i in the baskets M and C , is known as an **issuer**.



2. Pricing

2.1 Useful Values



3. Hedging

3.1 Proxy

3.2 Fixed Income



Index

B

Base currency	5
Bundle	6

C

Cash basket	5
Cash instrument	5

F

Financial instrument	5
----------------------------	---

I

Issuer	6
--------------	---

L

Local currency	6
----------------------	---

M

Market basket	5
---------------------	---