# SWAP TRANSACTIONS

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# SWAP TRANSACTIONS[1]

## 1.0  Introduction

The concept of Swap is quite simple though often misunderstood by many. It is as simple as exchanging (swapping) items or cash flows between two parties (individuals or institutions). Basically, swap refers to a contract in which two individuals (or counterparties) agree to either exchange cash flows (that are linked to either interest rates, commodity prices, currencies or equities) within a specified period. This Educational Series attempts to discuss the concept of swap transactions and their types; its pricing and valuation and the risks associated with them. It also contains illustrations and tables to enhance readers' understanding of the subject matter.

The series is subdivided into six (6) sections. Following the introductory section, section two contains definitions and concepts of Swap. Section three discusses the reasons for swap transactions, while section four examines the different types of swap contracts. Section five contains the pricing and valuation of swaps; while Section six discusses the risks associated with swap transactions.

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[1]    The contributors to this series are: Yakub, Maaji Umar; Ikenna-Ononugbo, Azumi Awawu; Nwosu, Chioma Peace; Elisha, Josiah Dassa and Opiah, Dominic Chioma

## 2.0 Definition and Concepts in Swap Transactions

### 2.1 Definition of Swap

A swap transaction is an agreement between two parties to exchange sequences of cash flows for a set period. Usually, at the time the agreement is initiated, the cash flow is determined by uncertain variables, such as interest rate, foreign exchange rate, equity price or commodity price. Swap transactions have two legs: the fixed and the variable legs. The holder of the fixed leg of the swap makes payments based on a fixed interest rate. On the other hand, the holder of the variable leg makes payment based on a variable interest rate that is usually market-determined. The London Interbank Offered Rate (LIBOR)[2] is a typical example of market-based rate.

The origin of swap can be traced to the 1970s when investors in the United Kingdom used back-to-back loans [3] to by-pass the British government's policy on foreign exchange controls and capital restrictions. A back-to-back loan allows counterparties to have access to the foreign exchange of another country without paying any foreign currency taxes. The major shortcoming of the back-to-back loan agreement is that each loan has a separate agreement

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[2]   This serves as the first step in calculating interest rates on various short term loans throughout the world. It is an interbank rate that is widely used for swap transactions globally.

[3]   Back-to-back loans allows two counterparties in different countries to exchange loans in the currency of their individual countries

such that one party could still be obligated to continue payments even if the other party defaults. To mitigate this shortcoming, in the early 1980s the back-to-back loan was structured into a formalised swap agreement referred to as currency swap. The first formalised swap agreement was the currency swap between International Business Machines (IBM) and the World Bank in 1981. In late 1981, swap was extended to credit market instruments that were denominated in the same currency (Plain Vanilla interest rate swap). Other forms of swap contracts (commodity, equity, etc.) have emerged over the years owing to the sophistication of the global financial environment.

### 2.1.1   Features of Swap Transactions

A typical swap transaction has the following characteristics:

- It is a bilateral agreement between individuals or entities to exchange cash flows (payments) over a specified period and rate;
- It may involve an intermediary or a 'swap bank' who brings together the counterparties for a premium;
- The principal or notional amount may be re-exchanged at the end of the swap contract;
- They are traditionally over-the-counter (OTC) financial derivatives; and

- Payment intervals in swap vary depending on the term structure of the swap agreement (quarterly, semi-annually or annually).

## 2.2 Concepts in Swap Transactions

- **Counterparties** – These are the parties (individuals or entities) involved in the swap transaction.

- **Notional/Principal Amount**: This is the amount or value that the underlying price (interest rate, exchange rate, equity or commodity price) is applied on to get the streams of future payments by both parties in a swap agreement;

- **Fixed Rate** - This determines the rate that will be used to calculate the amount to be paid by the fixed payer. This stream of payments is known as the fixed leg of the exchange;

- **Fixed Payer** – This is the party holding the fixed-leg in a swap transaction. He pays the fixed rate to the other party;

- **Floating Rate** - This defines the rate (coupon) used for setting the floating payment obligation. The most commonly used rate is the LIBOR or some stock index.

- **Swap Rate** – This is the rate of the fixed rate of a swap transaction.

- **Equity Leg** – This is the leg of an equity swap contract that is based on the performance of a share (stock) or stock market index.

- **Swap Bank** – This is a financial institution that acts as an intermediary in a swap transaction and earns premium for their services.

- **Coupon** – This is the annual interest rate paid on a swap transaction. It is usually expressed as a percentage of the notional amount.

- **Coupon Frequency** – This defines how often coupons are to be paid between the counterparties. The term of the index will often match the frequency of the coupons. For example, 3-month LIBOR is paid quarterly, while a 6-month LIBOR is paid semi-annually. Others are annual and monthly.

- **Day Count Conventions** - These are used for computing the portions of the year when calculating coupon amounts.

- **Business Day Convention** - This outlines how coupon dates are adjusted for weekends and holidays. Typical conventions are 'Following Business Day' and 'Modified Following.'

- **Modified-Following** – This refers to the automatic change in payment day on a swap or other contractual transaction that does not fall on a business day. If for instance if the payment day falls

on a non-business day, then the payment day is automatically rolled over to the next business day. If the next business day, however, falls on a new month, the business day that precedes the payment date is used.

- **Following-Business-Day** – This implies that the payment date of a contract has been moved to the next business day.

- **Effective Date** - This is the commencement date of the swap. It defines when interest accumulation on the first coupon payment will start.

- **Maturity Date** – This is the date of the last coupon. It defines when the obligations between the two parties end.

- **Over-the-Counter (OTC)** – Refers to a dealer network different from a formal exchange for the trading of securities including swaps.

- **Financial Derivatives** – These are financial contracts between parties where movements in the prices of the underlying assets (commodities, interest rates, stocks, bonds and market indices) determine the contracts' value.

## 3.0   Why Swap?

There are several reasons why counterparties may want to engage in swap transactions. They include:

- **Risk Management:** Swap transactions serve as a risk management tool in hedging against probable losses emanating from the characteristic fluctuation in commodity prices, interest rates, exchange rate and equity prices;

- **Financing Access:** Swap transactions enable a company to access cheap finance by tapping into the cash reserves of another firm;

- **Tool for Hedging**: Swaps are typically hedging tools. They are used to guide against exposures to unanticipated interest rate, exchange rate, commodity price and equity risks;

- **Instrument of Unconventional Monetary Policy:** In recent times, bilateral currency swap agreements between economies have been utilized as a tool for managing liquidity and foreign exchange pressure;

- **Flexibility:** Swap agreements are both negotiable and renewable up to at least 10 years. Also, most swap agreements are non-obligatory, that is, if a party defaults, the other party is not bound to continue the countract;

- **Minimizes Transaction Costs and Taxes**: Swap enables users to reduce and in some cases avoid transaction costs. For instance, investors can access foreign markets without having to contend with margin, capital control, and institutional rules. Firms can also access finance from their subsidiaries abroad through the engagement of counterparties in the host country as in the case of a currency swap, thus, bypassing stiff regulations and avoiding transaction taxes.

## 4.0    Types of Swap Contracts

### 4.1    Interest Rate Swap

An interest rate swap is a bilateral agreement between two parties/counterparties to exchange a stream of future interest payments on a principal amount based on specified interest rates for a set period. This type of swap is structured such that one party pays a fixed rate (the "Fixed Payer"), while the other party pays a variable rate (the "Floating Payer"). Conventionally, the 'buyer' of the swap is the 'fixed rate payer,' while the 'seller' is the 'floating rate payer.' It is worthy of note that in an interest rate swap, the parties do not exchange the principal. On the payment date, it is only the difference between the fixed and variable interest amounts that is paid; there is no exchange of the full interest amounts.

### 4.1.1 Variants of Interest Rate Swap

There are three main variants of interest rate swaps:

**4.1.1.1 Fixed-for-Float:** This is the exchange of a stream of fixed interest payments for a stream of floating interest payments. The fixed rate payment (known as the swap rate) is predetermined, while the floating rate payment is linked to some index (such as the LIBOR) which fluctuates throughout the length of the contract. The tenor of this swap ranges from 1 to 15 years.

**4.1.1.2 Float-for-Float:** This involves the exchange of floating interest payments based on the same or different indexes. In this regard, one party pays a floating interest rate anchored on a reference index A, to receive a floating rate payment anchored on the same/another reference index B, on a given notional amount, for a specified number of years.

**4.1.1.3 Fixed-for-Fixed:** This is an arrangement where the interest payments exchanged by the two counterparties are based on a pre-determined (fixed) rate. The absence of variability in either of the two rates means the payments will not change throughout the tenor of the swap. This is a special case of interest rate swap (similar to a cross-currency swap) where each party uses a different currency.

**Example**

Assume John owns a ₦1,000,000 investment that pays him NIBOR + 1% every month and Sandra owns a N1,000,000

investment that pays her 1.5% every month. As the NIBOR fluctuates, the payment John receives changes, while the payment Sandra receives remains the same. If John decides to lock-in a constant payment and Sandra agrees to take a chance of receiving higher payment, then John and Sandra can agree to enter into an interest rate swap contract.
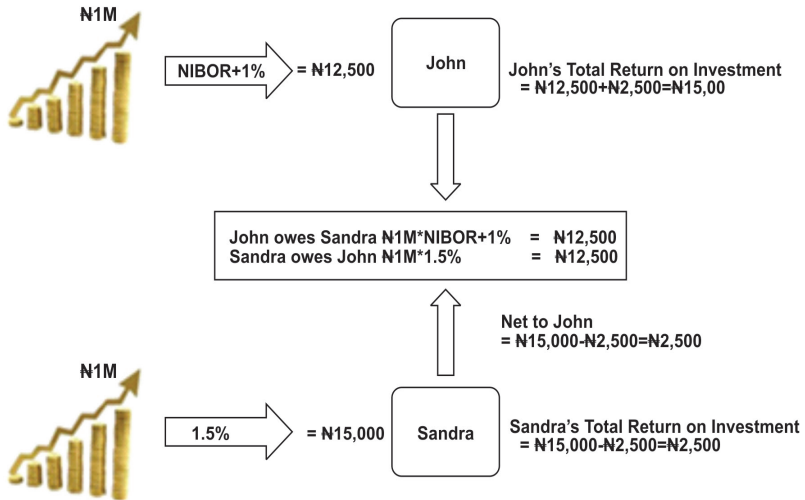
Under the terms of their contract, John agrees to pay Sandra NIBOR + 1% per month on a ₦1,000,000 notional amount, while Sandra agrees to pay John 1.5% per month on the same notional amount. Let's see what this deal looks like under two different scenarios.

### Scenario 1: NIBOR = 0.25%

Prior to the initiation of the contract, John receives a monthly payment of ₦12,500 from his investment (₦1,000,000 x (0.25% + 1%)), while, Sandra receives a monthly payment of N15,000 from her investment (₦1,000,000 x 1.5%).

With the swap contract, John owes Sandra ₦12,500 (₦1,000,000 x NIBOR+1%), and Sandra owes John ₦15,000 (₦1,000,000 x 1.5%). The two transactions partially offsets such that Sandra pays John the difference of ₦2,500.

## Figure 1: Graphical Illustration of Scenario 1



₦1M

| NIBOR+1% | = ₦12,500 | John | John's Total Return on Investment = ₦12,500+₦2,500=₦15,00 |

| John owes Sandra ₦1M*NIBOR+1% | = | ₦12,500 |
| Sandra owes John ₦1M*1.5% | = | ₦12,500 |

Net to John
= ₦15,000-₦2,500=₦2,500

₦1M

| 1.5% | = ₦15,000 | Sandra | Sandra's Total Return on Investment = ₦15,000-₦2,500=₦2,500 |

## Scenario 2: NIBOR = 1.0%

Now, assuming the NIBOR increases to 1%, John will receive a payment of N20,000 (₦1,00,000 x (1% + 1%)) on his investment instead of the agreed ₦15,000 under the contract, Sandra still receives a monthly payment of ₦15,000 (₦1,000,000 x 1.5%) on her investment. The two transactions offset with John giving Sandra the difference between the swap interest payment which is ₦5,000.

**Figure 2: Graphical Illustration of Scenario 2**



₦1M

NIBOR+1% = ₦20,000

John

John's Total Return on Investment = ₦12,500+₦2,500=₦15,00

John owes Sandra ₦1M*NIBOR+1% = ₦20,000
Sandra owes John ₦1M*1.5% = ₦15,000

Net to Sandra = ₦20,000-₦15,000=₦5,000

₦1M

1.5% = ₦15,000

Sandra

Sandra's Total Return on Investment = ₦15,000-₦5,000=₦20,000
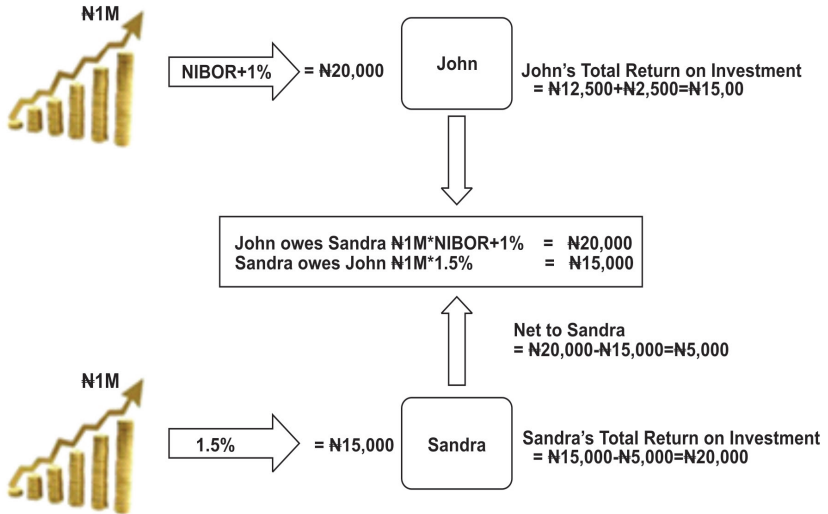
With NIBOR at 1%, John is obligated under the terms of the swap to pay the difference.

Note that the interest rate swap has allowed John to guarantee himself a ₦15,000 payout; if NIBOR is low, Sandra will owe him under the swap, but if NIBOR is higher, he will owe Sandra money. Either way, he has locked in a 1.5% monthly return on his investment. Sandra has exposed herself to variation in her monthly returns.

## 4.2 Currency Swap

This is an agreement between two parties to exchange cash flows in different currencies at some predetermined rates for a specified period. It involves exchanging both the

principal and the interest payments on a particular loan in one currency for the principal and the interest payments for the equivalent of the same loan amount in another currency. It could also be an arrangement between counterparties in different countries aimed at financing economic activities (e.g. trade, business operations, etc.) in their local currencies at the pre-determined exchange rates, without bringing in a third country currency like the US Dollar. The parties to a currency swap usually exchange the principal at the beginning and at the end of the swap period.

A typical currency swap has three cash flows:

- The exchange of principals at the beginning of the contract;
- The exchange of interest payments during the contract period; and
- The re-exchange of principals at the end of the contract.

The associated cash flows are denominated in different currencies and the principal amounts are usually exchanged at the start and maturity dates. The exchange rate and interest rate used can either be fixed or at the prevailing exchange rate (Floating or spot rate) at the time of the transaction.

**Figure 3: Currency Swap Cash Flow**
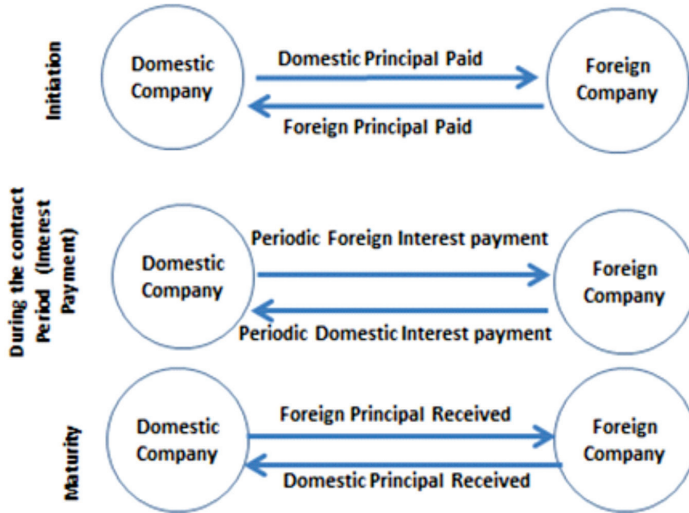


### 4.2.1 Variants of Currency Swap

There are three (3) main variants of currency swaps: fixed-for-fixed, fixed-for-floating and floating-for-floating. These forms of currency swaps are best illustrated with examples. Let us consider a four-year currency swap with a semi-annual payment involving a Ghanaian cedi based on a swap rate of 3.84% and a Nigerian Naira, based on a swap rate of 2.5%. The principal amount is ₦12.71 million which is equivalent to GH₵ 10.00 million at a spot exchange rate of 0.79 (GH₵ /N). At the beginning of the contract, the counterparties will exchange the two principal amounts. In

this regard, Party One sends GH₵10.00 million to Party Two, while receiving ₦12.71million from Party Two.

Let us consider the variants of currency swaps using the background information above.

**4.2.1.1 Fixed-for-fixed:**   In this variant, payments in both currencies are based on the associated fixed interest rates. From the preceding illustration, Party One receives from Party Two Ghanaian cedi interest payment based on a 3.84% fixed rate applied to the notional amount of GH₵10.00 million over the duration of the swap. Similarly, Party Two receives from Party One Nigerian Naira interest payments based on a 2.50% fixed rate the notional amount of ₦12.71million over the lifespan of the swap. At maturity, and regardless of whether there was an initial exchange, the counterparties exchanges the original principal amounts. Party One receives GH₵10.00 million from Party Two and returns ₦12.71million to Party Two.

## Figure 4: Fixed-for-Fixed Currency Swap
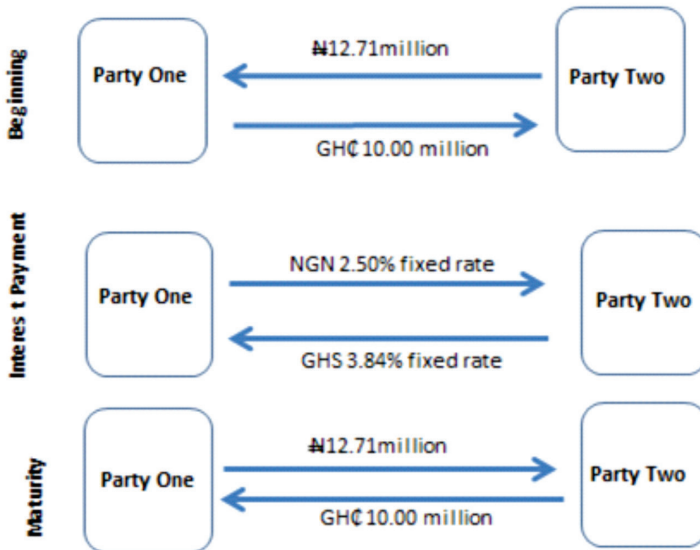


**4.2.1.2 Fixed-for-Floating:** This entails the payment of a fixed interest rate on one currency and the receipt of a floating interest rate on another currency. Referring to the earlier background information, Party One receives from Party Two Ghanaian cedi interest payments based on a 3.84% fixed rate on a principal amount of GH₵10.00 million over the lifespan of the swap. On the other hand, Party Two receives from Party One Nigerian Naira interest payment based on a floating or market-determined rate on the principal amount of ₦12.71million. At maturity, the

original principal amounts are re-exchanged between the two parties.

**Figure 5: Fixed-for-Floating Currency Swap**
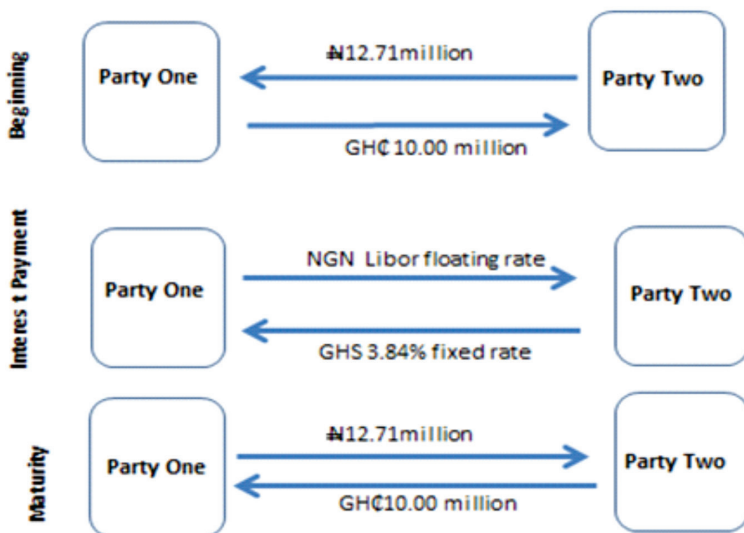


**4.2.1.3 Floating-for-Floating:** Under this arrangement, the interest rates applied on the two currencies are market-determined (floating rates). Following our background information, both parties receive interest payments on the principal amounts (GH₵ 10.00 million, for Party One and ₦12.71 million for Party Two). As typical of other forms of currency swap, regardless of whether there was an initial exchange, the counterparties would re-exchange the original principal amounts.

**Figure 6: Floating-for-Floating Currency Swap**
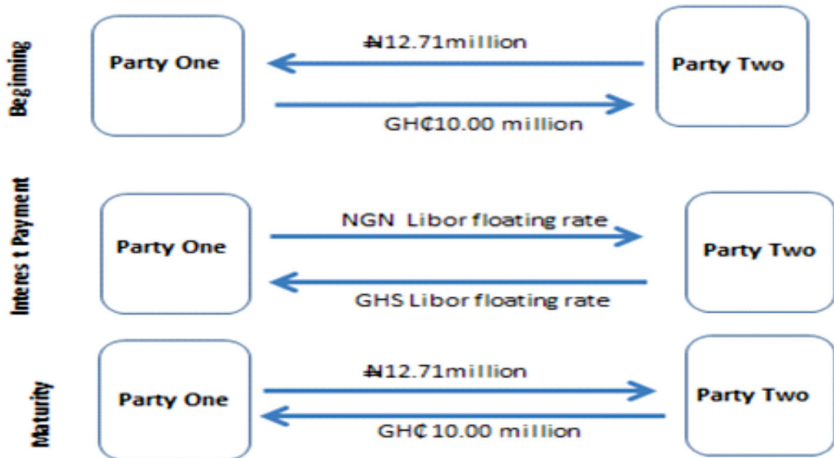


## 4.3    Commodity Swap

A commodity swap is a two-sided contract whereby the price of a commodity (an underlining commodity) is traded over a specified period. The contract has two legs. One party (the 'fixed price payer') makes a periodic payment based on an agreed fixed price for the specified commodity; while the other party (the 'floating price payer') makes a periodic payment based on a floating price for the same commodity.  The floating price is usually an average spot price calculated over some predetermined period. Generally, the fixed price payers are consumers who intend to protect themselves against price swings,

while the floating price payers are producers who seek to guarantee their commodity prices.

### 4.3.1    Variants of Commodity Swap

**4.3.1.1 Fixed-Float Commodity Swap:** This is the most common or basic form of commodity swap (also known as the Plain Vanilla commodity swap).  In this regard, one of the counterparties (the fixed price payer) agrees to pay cash flows based on a fixed price of the underlying commodity and receives cash flows in turn based on a floating price of the underlying commodity .

**4.3.1.2 Commodity for Interest Swap:** This form of commodity swap is similar to the equity swap in that the cash flow on the underlying commodity is exchanged for interest payments, plus or minus a spread. It derives from the view that changes in interest rate induce fluctuations in the prices of some commodities.
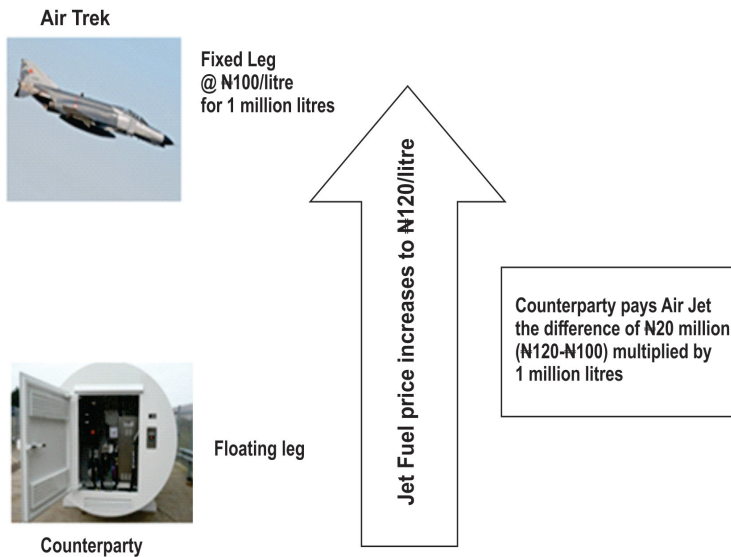
**Example**

A hypothetical airline company (Air Trek), enters an agreement to receive one million litres of jet fuel for four (4) months. Let us assume that Air Trek takes the fixed leg of the swap for N100 per litre, while the counterparty holds the floating leg of the swap.

## Scenario 1: Jet Fuel Price = ₦120

An increase in the market price of jet fuel to ₦120 per litre, within the contract period, requires the counterparty to pay Air-Trek the difference of ₦20 million ((₦120 - N100) X 1 million litres).

### Figure 7: Graphical Illustration of Scenario 1



**Air Trek**

Fixed Leg
@ ₦100/litre
for 1 million litres

Jet Fuel price increases to ₦120/litre

Counterparty pays Air Jet the difference of ₦20 million (₦120-₦100) multiplied by 1 million litres

Floating leg

**Counterparty**
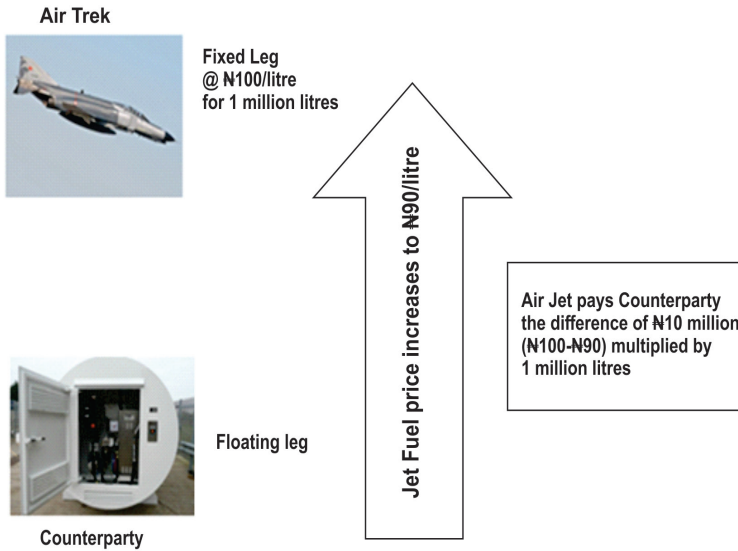
## Scenario 2: Jet Fuel Price = ₦90

Conversely, a decline in jet fuel price to ₦90, would require Air-Trek, to pay the counterparty ₦10 million ((₦100-N90) X 1 million litres) on the settlement date.  Thus, fluctuations

in the market price of jet fuel are eventually offset by the agreement of both parties to trade the price differences.

**Figure 8: Graphical Illustration of Scenario 2**



Air Trek

Fixed Leg
@ ₦100/litre
for 1 million litres

Jet Fuel price increases to ₦90/litre

Air Jet pays Counterparty the difference of ₦10 million (₦100-₦90) multiplied by 1 million litres

Floating leg

Counterparty

## 4.4  Equity Swap

An equity swap is an agreement that empowers counterparties to exchange cash flows from two different assets. In this arrangement, party one agrees to exchange the rate of return or market index of an equity (stock) for the counterparty's fixed or floating interest rate or returns on another stock or index at specified future dates. The leg linked to the interest rate is called the "floating leg", while

that to the rate of return on the equity is called the "equity leg". Generally, notional amounts are not exchanged in equity swaps, and the return on the market index can either be positive or negative.

### 4.4.1 Variants of Equity Swap

The variants of equity swap include:

- **Equity Return Against a Fixed Rate**: This is an equity swap whereby one leg pays the return on an equity (stock, share) or market index of the equity and the other leg pays a fixed rate.

- **Equity Return Against a Floating Rate**: Under this arrangement, one party pays the return on an equity (stock, share) and the other party pays a floating rate (the current market interest rate i.e. LIBOR). The prevailing market rate at the beginning of the contract determines the first payment.

- **Equity Return Against Another Equity Return**: In this scenario, both parties base their payment streams on the returns of two different domestic equity market indices (for instance, in Nigeria, one party in the swap transaction pays the return on the financial sector stock index, while the other party pays the returns on the industrial sector stock index).

- **Equity Return Against a Foreign Equity Return**: This is an equity swap whereby both parties base their

payments on the return of two different equity market indices. An example is when one party pays the returns on the Nigerian Stock market index while receiving the returns on the S& P 500 index from the counterparty.

- **Equity Swaps with Changing Notional Capital**: In the basic equity swap, the notional amounts are not exchanged, but in this case, the notional amounts are exchanged. The two notional principals will be required at the beginning of the swap, and their value may differ because of the prevailing exchange rate at the beginning of the swap.

**Example**

Consider two asset managers (A and B) managing Fund A and Fund B. Asset Manager A whose Fund portfolio tracks the Nigeria All Share Index (NASI) decides to enter a swap with Fund B with a notional principal of ₦100 million and the total returns on the NASI, while Fund B pays a fixed interest rate of 6%. Payments are to be made bi-annually, and the swap is expected to mature after 3 years.

From this illustration, asset manager A pays asset manager B a floating rate pegged to the NASI, while manager B makes periodic 6% interest rate payment to manager A, on the given notional amount of ₦100 million, for a 3-year period.

If the NASI returns are positive, Fund A pays NASI returns to Fund B and Fund B pays the fixed rate to Fund A. When the NASI returns are negative, Fund A pays nothing to Fund B, but Fund B pays the fixed rate and the percentage loss on the NASI return to Fund A.

Assuming at the beginning of the contract, the NASI was 2500 and later moved to 2600 and 2570 at the end of June and December, respectively. Thus, at end-June, Fund A pays Fund B the return on NASI of 4% $\left\{ i.e. \left(\frac{2600}{2500} - 1\right) * 100 \right\}$ on the principal amount of ₦100.0 million. Fund B, therefore, receives, ₦4,000,000 { i.e.₦100,000*4%},

while Fund A receives fixed rate of 6% on the principal ₦2,991,780 {i.e.₦100,000*182*6%}.

In the second tranche of the payment, end-December, Fund A pays nothing since the return on the index is negative $\left(\frac{570}{2600} = -1.154\%\right)$, but Fund B pays the fixed interest on the principal plus a floating rate on the principal i.e. the loss on the return on NASI {₦100,000*1.154%=₦1,154,000}. Thus, Fund A receives from Fund B a total of ₦4,162,219.00 {₦3,008,219+₦1,154,000}.

## 5.0 Swap Pricing and valuation

This section provides a simplified framework for understanding swap pricing and valuation. The 'price' and 'value' of a swap are two distinct concepts. The price of a swap refers to the interest rate used to determine the fixed rate payments in a swap transaction, while, the value of a swap refers to the difference between cash flows based on the fixed and floating rate payments. The value of a swap can be expressed as:

$$V = \left\{ B^{fixed} - B^{floating} \right\} N_v$$

Where (multiplied by ) is the total value of the cash streams on a fixed rate bond and (multiplied by ) is the total value of cash streams on a floating rate bond; while is the notional amount of the swap transaction. The expression above represents the value of a *'receive fixed, pay floating'* swap in which case the party takes a long position in the fixed rate bond and a short position in the floating rate bond. Conversely, the value of a *'pay fixed, receive floating'* swap is expressed as:

$$V = \left\{ B^{floating} - B^{fixed} \right\} N_v$$

The above expressions suggest that the value a swap transaction is derived from its pricing.

At the origination of the swap (time zero), the price of the fixed rate bond and the floating rate bond are equal, so that the value of the swap contract equals zero[4]. Beyond the origination of the swap, the value of can be positive or negative.

Some important information required to price a swap include: the tenor, frequency of settlement, dates of payment and the day count conventions.

The pricing of a swap transaction makes two assumptions:

- at origination, the value of the swap is zero, and
- the face value of a floating rate bond is the same at issuance.

The standard convention is that the floating rate is Libor rate at the start of the contract. Assuming the notional amount is equal to one (say N1); applying the first assumption, and taking to be equal to N1 as in the second assumption, we have:

$$V = B^{fixed} - B^{floating} = 0, \text{ and}$$
$$V = B^{fixed} - 1 = 0, \text{ so that}$$
$$B^{fixed} = ₦1$$

This is in line with the general principle that states that the price of a swap is the rate (coupon) that equates the value

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4   Mathematically: $\Sigma PV_0 \left[ B_t^{fixed} \right] N_v = \Sigma PV_0 \left[ B_t^{floating} \right] N_v$ such that the present value of cash flows from the fixed rate payments equals the present value of cash flows from the floating rate payments.

of the fixed rate bond to that of the floating rate bond, so that at the beginning of the contract, the value of the swap is zero.

This pricing and valuation framework directly applies to the Plain Vanilla forms of interest rate and equity swaps. The pricing and valuation of other types of swap require some modifications to the original framework and are discussed below.

## 5.1.    Pricing and Valuation of Other Swaps

### 5.1.1   Currency Swap

The earlier framework discussed provides some intuition into the pricing and valuation of a currency swap. The following assumptions hold:

- The swap contract comprises two bonds – a fixed rate bond and a floating rate bond;
- At initiation, the value of the swap is zero given that the value of the fixed rate bond equals the value of the floating rate bond; and
- The floating bond rate sells at face-value (say, N1).

A major distinction between the interest rate swap and the currency swap is that, in the latter, the principal are not just 'notional,' they are actually exchanged both at the beginning and at maturity.

Let $S_0$ be the spot exchange rate between two currencies, and $P_0^{Domestic}$ and $P_0^{Foreign}$ represent the initial value of the bonds (with fixed or floating cash flows) expressed in domestic and foreign currencies, respectively. Thus, the value of the currency swap can be expressed as:

$$V_0 = P_0^{Domestic} - \left\{P_0^{Foreign} * S_0\right\} = 0 \quad \cdots \quad \text{value at time of}$$
inception

$$V_t = P_t^{Domestic} - \left\{P_t^{Foreign} * S_t\right\} \gtrless 0 \cdots \quad \text{value for a 'receive}$$
domestic/pay foreign' swap

$$V_t = \left\{P_t^{Foreign} * S_t\right\} - P_t^{Domestic} \gtrless 0 \cdots \quad \text{value for a 'receive}$$
foreign /pay domestic' swap

At other periods other than period zero, the value of a currency swap can be positive (greater than zero) or negative (less than zero).

In line with the basic framework of swap pricing, the pricing of currency swap can be determined from its value at origination. The prices or value of each bond, $P$, at the inception of a currency swap, also equal to their principal.

### 5.1.2 Commodity Swap

The price and value of a commodity swap are derived by some mathematical derivations that equate the cash flows of fixed and floating bond prices resulting in the expression:

$$V = \sum_{t=1}^{n} \frac{\overline{C} - \check{C}}{(1 + R_t)^t}$$

The equation above expresses the value of the swap (V) for a series of forward contracts (periods t=1, 2, ... n).$R_t$ is the zero coupon rate used to discount the streams of future cash flows (say, forward prices of the underlying commodity), while $\overline{C}$ and $\check{C}$ are the fixed and floating prices of the commodity. At the beginning of the contract, the value of the swap transaction is zero, so that it is possible to solve for the fixed price of the swap.

## 6.0   Risks Associated with Swap

A number of risks are associated with swap transactions. These risks include:

**Credit Risks**: This is the risk that counterparties may default on payments. It is the basic risk associated with swap transaction. In most financial contracts, this type of risk is also known as default risk;

**Interest Rate Risk:** This is the risk that the worth/value of an investment will change due to variations in the absolute level of interest rates and the spread between two rates. The values of bonds are more directly affected by interest rate risks than stocks; hence, it is a major threat to bondholders;

**Search Cost**: This is the cost associated with finding a willing counterparty. The process might be expensive regarding fees charged by an intermediary or the cost of management time in negotiation. There are also, legal charges for drawing up the currency swap agreement;

**Mismatch Risk**: This arises from the inability to find a counterpart that wants to initiate a swap for the same amount and at the same period (maturity);

**Exit Restriction**: Should one party wish to exit the swap before maturity, the exiting party must secure the consent of its counterparty before pursuing a mutually agreed exit strategy which might be difficult to achieve;

**Sovereign Risk**: This risk arises from the imposition of exchange rate restrictions by either of the two countries involved in a swap transaction. This might affect the performance of the swap.

## Further Reading

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