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**Introduction of Inflation Linked Bond in Nigeria:
Prospects and Challenges**

Akanbi, Abiodun

Infinity Trust Mortgage Bank PLC, Area 3, Garki, Abuja

E-mail: abiodunakanbi1@yohoo.com

Phone: +2348098252065

&

Alabede, Abdulsamad

Department of Economics

College of Education, Azare, Bauchi State

E-mail: abdulsamadalabede@gmail.com

Phone: +2348034358801

Abstract

Protection against inflation is an essential part of contemporary financial markets, particularly in high-inflation economies like Nigeria. Nowadays, inflation linked instruments are becoming popular in the world financial markets. The objective of this paper is

to examine the issues that may arise if inflation linked bond are introduced in Nigeria. The paper also explore the different motivations in which for using inflation linked bonds by issuers and the preference by investors relative to other funding options(for issuers) and investment portfolio (by investors) in Nigeria.

Introduction

The Nigerian domestic market has grown over the years; between 1985 and 2002, the Federal Government did not play a part in the bond issuance market. The Federal Government of Nigeria (FGN) through the Debt Management Office (DMO) issued the FGN bonds 2003, the first in over 18 years in 2003. Since 2003, the Government is able to build a robust Federal Government Bond Market with a vibrant secondary market.

Presently the Government through DMO conducts issuance through a monthly auction programme. The Current tenors of the FGN Bond are: 2, 3, 5, 7, 10 and 20 years. The Nigerian domestic bond market is the second largest in Africa (second to South Africa) with a market of 5.1 trillion naira (USD 30B).

It is an entrustment in which investors such as pension funds administrators will want to invest. In Nigeria Pension fund assets are expected to continue to grow, this growth provides a source of demand for ILB's.

Definitions

Inflation-linked bonds (also known as Inflation-indexed bond) are bonds where the principal is indexed to inflation. They are designed to eliminate the inflation risk of an investment and protect the real value of the investor's asset regardless of the prevailing inflation rate. ILBs have attributes similar to those of standard fixed-coupon bonds i.e.

- Coupons will be paid bi-annually and one of the coupon payment dates will coincide with the anniversary of the bond's maturity date.

- The entire capital of the bond will be redeemed at maturity date.

However there are 2 types of ILBs issued in the market these are:

- (i) **Capital indexed Bond:** In this case all of the cash flows (the real coupon and repayment of principal at maturity) are indexed to the change in inflation between the value of the price index on the issue's launch and the value of the index on the payment date of these cash flows. Must offer floor protection for the principal i.e. the principal will be redeemed at original issuance price even if there was deflation during life of the ILB. Some other ILBs do not offer floor protection i.e. the principal is adjusted for deflation.
- (ii) **Coupon indexed Bond:** In this case, there is a non-indexed principal. The coupon pays the annual change in inflation, applied in percentage of the issue's nominal amount. The nominal amount of the issue is repaid at maturity.

Brief History

The first known inflation-indexed bond was issued by the Massachusetts Bay Company in 1780 in the USA. Most governments of developed economies issue inflation-linked bonds. The British government began issuing ILBs in 1981; they now represent approximately 16% of the UK's total outstanding debt. The Treasury Inflation Protected Securities (TIPS) in the United States was introduced in 1997. US TIPS assets have grown to \$560 billion in 2011 since they were first issued and have been a key source of growth in the marketplace. The TIPS in United States account for about 6% of total outstanding debt. The global market for ILB's has moved from a market capitalisation of USD100bn in 1997 to over USD1, 800bn in 2010, an annual growth rate of 23%.

Inflation linked bonds were first issued by the South African Government in the year 2000 thus becoming the first African Country

to issue an ILB. Globally the ILBs market primarily consists of sovereign bonds, with privately issued inflation-linked bonds constituting a small portion of the market.

Secondary markets for ILBs are small and relatively illiquid compared to conventional bonds. This is because Investors will want to hold to maturity. The investors may also demand a premium in the form of a higher real return relative to that received from conventional bonds to compensate for low trading volume and the small size of the ILBs market. Consequently, the difference between conventional and ILB will measure the liquidity risk premium as well as expected inflation and inflation risk premiums.

Table 1: Some Inflation Linked Bond Features Issued Globally

S/N	Country	Instrument Name		Inflation Index		Floor protection	Tenor(Years)		Index Lag periods (months)
1	USA	Treasury Inflation-Protected securities (TIPS)		US Consumer Price Index		Available	1-30		Three
2	United kingdom	Inflation-linked Gilt (ILG)		UK Retail Price Index (RPI)		Not Available	1-50		Eight or Three
3	France	France Domestic Inflation linked Bond	France Euro Zone Inflation Linked bond	French CPI ex-tobacco	EUHICP ex tobacco	Available	2-18	1-29	Three
4	Canada	Real Return Bond (RRB)		Canada All-Items CPI		Not Available	20,25,31,32,33		Three
5	Australia	Capital Indexed Bonds		Weighted Average of Australia Eight Capital Cities Index		Available	10 -24		Six
6	Germany	German index Bund		EUHICP ex tobacco		Available	2-9		Three
7	Japan	Japan Government Index Bond		Japan CPI(Nationwide ex-fresh food)		Not Available	10		Three
8	Italy	Italy inflation linked Bond		EUHICP ex tobacco		Available	1-30		Three
9	South Africa	i. Inflation linked bond ii. Inflation linked retail savings bond		South African Consumer Price Index (CPI) all items		Available	2-22		Three
10	Uruguay	Uruguayan Global Inflation Linked Bond.		National Uruguayan CPI		Not Available	1 month-25 years		One
11	Brazil	Brazilian Inflation Linked Bond		Brazil Consumer price Index		Available	1-40		One plus forecast for current month

EU-HIPC: European Union Harmonised Index of Consumer Prices.

Source HSBC 2011

Pricing

In pricing an ILB issuance a base inflation figure has to be determined on the date of issue and measured over the tenor of the bond.

The interval of time between publishing inflation data and cash flows has led to the development of a time lag models in the pricing of ILBs

There are two main reasons why cash flows payments from ILBs are indexed to inflation with a time-lag. These are:

- The time to compute and publish price indices. In most countries the CPI for a given month is typically published in the middle of the following month, which results in a lag of at least one month.
- For trading and settling bonds between coupons payment dates. Whenever a bond is traded on a day different from a coupon payment date, its valuation will reflect the timing of the cash flow payment on the next coupon payment date.

The Canadian authority for Real Return Bonds (RRBs) model which was introduced in 1991 is adopted by the majority of ILB issuers. The application of this method results in a total time-lag of three months.

This is because of the advantages the RRB model has over other methods. These advantages include:

- (i) It offers better protection for the investor (short indexation). Some other models use a longer time lag, for example, the eight-month lag model in the UK leaves investors exposed to inflation risk over the last eight months.
- (ii) It is easier to calculate real yield

The format has been adopted by UK, the Euro zone, the US and more recently in countries such as South Africa and Thailand.

Real Yield

The yield is calculated using the standard yield formula although the exact nominal value of future cash flow is unknown, the price

convention is to keep all variables in real terms and solve for a real yield that equates the current quoted price with the present value of the future cash flow.

$$P = (C/1+r) + 100/(1+r)$$

Where P = real price, C = real coupon rate and r = real yield

Inflation Reference

The data to be used are obtained from the indices published monthly Government (National Bureau for Statistics).

The precise details of the method of indexation for each bond will be set out in the Issuance Circular.

Index Ratio

The index ratio for an ILB pricing measures the growth in the CPI since a bond was first issued. An index ratio is applied to calculate the coupon payments, the redemption payment and accrued interest. For a given date it is defined as the ratio of the reference CPI applicable to that date divided by the reference CPI applicable to the original issue date of the bond.

Coupon Payments

The coupon payments are quantified only after the start of accrual period when the value of reference CPI is released (reference date is three months before the payment date). The index ratio is multiplied of semi-annual payments with half the coupon) and rounded according to the issuer specification of the rounding up convention.

Redemption and Maturity Payment

The maturity payment is made by multiplying the Principal by the index ratio.

Reference CPI for the Issue date and Settlement date:

Reference CPI date in relation to the issue date and settlement date

- (i) If the date is the first day of a calendar month, reference CPI date is the CPI for the 3rd calendar month preceding the calendar month in which the date occurs.
- (ii) If date occurs on any day other than the first day of a calendar month, then reference CPI date shall be determined by interpolation.

Tradability and Secondary Market Pricing

The ILBs will be tradable in the secondary market like the FGN Bonds with ownership of the instrument transferable between different holders.

The investors may also demand a premium in the form of a higher real return relative to that received from conventional bonds to compensate for low trading volume and the small size of the ILBs market. Consequently, the difference between conventional and ILB will measure the liquidity risk premium as well as expected inflation and inflation risk premiums.

The Clean Price of ILBs is issued on the basis of the real clean price. It is calculated by multiplying the clean price by the relevant index ratio.

The dirty price is calculated as the product of the real clean price plus the (inflation-adjusted) real accrued interest.

Rebasing of Index

Price indices are generally rebased at least once in a decade to depict changes in spending practices and income. If this is done it will affect the value of ILB issued prior to the rebasing of the index

If the Index is revised to a new base after the ILB is issued, a notional Index figures in substitution for the Index figures is used to determine the Reference Index figure applicable to the date on which repayment takes place and/or an interest payment falls due. However, this will have little impact on the price of the ILB.

These notional Index figures will be calculated by multiplying the appropriate actual Index figures by the Index figure on the old base for the month on which the revised Index is based and dividing the product by the new base figure for the same month.

Principal = {Principal X[CPI for New Series]/ Base CPI} X CPI (Old Series)/ CPI for (New Series)

Prospects

One of the fastest growing asset classes of the last 15 years has been inflation-linked (IL) bonds; the recent growth in emerging markets has also been spectacular, spurred by the high level of economic expansion that has been accompanied by rising rates of inflation.

From an investor perspective

Investors are more concerned about inflation risk over the long term than the short term, thus having a long term bond will suit the investors needs. Broadly the benefits are:

- i. Inflation-linked bonds provide arguably the only true hedge against the risk of inflation
- ii. Serve as an incentive to save for investors' thus promoting savings culture
- iii. Encourage longer tenured investments by investors
- iv. Pension funds have the ambition to offer pensions to retirees with a guaranteed buying power. One possible way to maintain the level of buying power is being compensated on the investments under management for inflationary movements.
- v. Regulatory Reason: The Pension Commission (PENCOM) was proposing in its draft Regulation on Investment of Pension fund Assets in 2010 provided that "All bonds and debt instruments in which Pension Fund Assets are to be invested whose tenor exceeds seven years shall be inflation indexed." This is aimed at protecting the value of Pension Funds investment in debt instruments.

From an issuer's perspective

Governments have continued to issue ILBs for broadly following reasons

- i. As a deliberate policy response to manage inflation expectations. There are numerous reasons for a sovereign to issue ILB's. In 1981 the UK government did so partly to enhance its inflation-fighting credentials. Similarly, Australia (1985), Sweden (1994) and New Zealand (1995) introduced ILB's to reinforce disinflationary policies. This has become far less relevant recently but there is still a case for developing countries with persistent high inflation to commit to their anti-inflation stance by issuing ILB. The surge in ILB issuance in Brazil in 2006 may have also been partly an anti-inflation measure. Having a well-defined real yield curve also allows policymakers to gauge inflation expectations by monitoring breakeven levels.
- ii. It will deepen the domestic bond market by providing a wider variety of instruments.
- iii. There is also the advantage for government borrowers to issue ILB. Because the risk between real and nominal liabilities implies that governments should issue a proportion of ILB debt. Obligations by the Government are often tied to cost of living and this would be more appropriately matched by ILBs rather than nominal bonds.
- iv. It will serve as bench mark for other ILBs to be issued by Sub National, Agencies and Corporate Issuers.
- v. Diversify funding sources for the Government by attracting new investors to the FGN bonds and also lowering borrowing costs and tapping into strong demand from pension fundswill lower the average cost of funding and reduce the concentration risk of tapping a narrow funding source.
- vi. This could also be an optimal way of smoothing short-term commitments because ILBs have typically longer duration

and cash flows are skewed towards the second half of the life of the issue.

Challenges

Index-based risk:

If the price index has overstates or understates inflation, then the corresponding ILB compensates for a higher or lower inflation than is necessary. This is because the construction of an inflation index is based on the prices of a basket of goods and services which might be selected on subjective basis.

If the CPI overstates the actual increase in prices of goods and services the ILBs will pay out a higher inflation adjustment than necessary. In this case Government will pay more interest than the actual change in inflation and vice versa in a case of underestimation.

Seasonality of Inflation

Inflation data exhibits strong seasonality effect due to the multiple economic cycles. These fluctuations are associated with retail sales concentrated around particular periods (festivities) and strong variation in the prices of certain components, such as food prices and transportation. The presence of inflation seasonality therefore has important implications in pricing of ILB's. This means that even if inflation peaks in January, the equivalent adjusted coupon payment will only come about a few months later. ILB's coupon and redemption payments would be higher during the period of high seasonality of inflation while these payments could be low during the periods of low seasonality of inflation.

Almost all issuers choose to use a seasonal unadjusted price index as reference index for an ILB

Time Lag and Settlement in the Secondary Market

The lag period becomes a problem due to trading and settling bonds between coupon payment dates. Trading in the secondary market allows bonds to be traded many times without the need to keep track

of every owner for the six months prior to a coupon payment. In an ILB, the next coupon payment amount and thus the accrued interest cannot be known until three months after the coupon payment date. Therefore, calculating the values of an ILB traded many times could be complicating.

Accounting Implications

The issuance of ILBs will have an impact on the records for Debt Service and Debt Stock.

Debt Service: The amount of debt service (cost) cannot be pre-determined. Since interest payments are a percentage of the principal, the interest amount changes as the principal adjusts. The debt service cost has to be estimated with expected inflation.

Debt Stock: The principal of an ILB is adjusted by the amount of inflation that has occurred since the bond was issued. The adjustment occurs by multiplying the index ratio by a bond's principal. Therefore the debt stock will vary all though life of the bond.

Implication on Cost of Borrowing Government

In an inflationary environment like Nigeria the issuance of inflation linked bonds will increase the cost of borrowing to Government. This is because the coupon and principal payment are linked to Inflation. However if inflation is low the cost of borrowing will also be low.

The cost of borrowing can be reduced by offering lower interest rate for these bonds. This is because investors will be willing to pay a premium for protection against inflation, then this premium will be reflected in a lower coupon to be paid by the Government on debt instruments that provide such protection. Inflation protection allows issuers to borrow more cheaply by issuing securities with lower nominal coupons. The issuance of index-linked bonds eliminates the risk premium that is often part of the calculation of yields on nominal bonds.

The yield (R) on a nominal bond would be the sum of three components

The Actual yield r

- The expected average inflation rate over the bond's life i
- The inflation risk Premium P

Then, $R = r + i + P$.

Because inflation-linked bonds are free of inflation risk, their yields do not contain an inflation risk premium ($R = r + i$) hence the issuer can offer a lower rate interest.

If the rate of inflation over the life of the bond turns out to undershoot expectations at the time of issue (which determine the nominal coupon the issuer must offer to attract investors), then the issuer will have borrowed more cheaply still.

Conclusion

ILBs would be a valuable innovation in the Nigerian financial markets, providing benefits to investors and Government. They protect investor from inflation risk which required in an inflationary environment like Nigeria. For long-term investors, ILBS can provide an inflation hedge and some diversification benefit to a portfolio which has important implications for investor objective setting and portfolio construction. The introduction will have benefits to both the issuers and investors especially in the management of pension assets. However there is the need to develop capacities terms human resource especially in risk management as well good publicity to make the general public to be informed of the new initiative if introduced

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