

AF4 2023/2024

Asset Classes: Gilts and Bonds

Part 3: Bonds and investors

The milestones for this part are to:

- Understand the role of Bonds in a portfolio
- Understand the risks of holding Bonds
- Understand the key factors in assessing whether a bond meets an investor's needs
- Know the different types of Bonds that are available.
- Understand how UK indexed linked gilts work.
- Know the main features of Corporate Bonds, zero coupon bonds and mini bonds
- Know the taxation of bonds.

The traditional role of Bonds in a portfolio is to:

- Provide regular guaranteed income.
- Reduce the volatility of the whole portfolio.
- Have an asset class that is negatively correlated to equities.

Whilst the first two are still valid, in recent years both bonds and equities have tended to move into the same direction.

The investor is subject to a number of specific risks by holding bonds.

Inflation risk. As the income and capital repayment is fixed the real value of these will fall in real terms.

Capital risk. The price of the bond will fluctuate and can fall.

Default risk. This doesn't apply to Sovereign debt issued by the most developed economies.

Reinvestment risk. The bond will eventually be repaid and the investor will have to find somewhere to invest the capital sum. For example a Gilt paying an 8% coupon was repaid in June 2021. Investors who held this from the beginning had a very good source of income but that came to an end in 2021 and had to find a new home for the money.

What type of Bonds?

The choice for investors will be:

- UK conventional gilts
- UK indexed linked gilts
- Non UK sovereign debt
- Corporate Bonds
- Retail Bonds
- Mini Bonds

UK conventional gilts

Investors will probably use gilts for two main purposes:

- To provide a guaranteed income for a set period.
- To have an asset that is negatively correlated to other assets, particularly equities
- With UK gilts to provide a virtually risk-free return.

Investors who buy new gilts at issue with the intention of holding until redemption will know exactly what they are going to get in relation to the income and capital redemption. It is subject to inflation risk on both the income and capital.

We would normally expect gilts and equities to be negatively correlated. They offer a virtually risk-free return that can be determined by the gross yield to redemption at purchase. Since the 2008 banking crisis both gilt and share prices rose. This was as a result of QE pushing the yield down and therefore the price up. Because the yield was low investors looked to invest in shares to get a higher return. This in turn pushed share prices up.

As stated in the previous part UK Gilts fell in price in the last half of 2022 which of course meant that yields rose. Conversely this could mean that they now look an attractive investment as yields on a 10-year gilt are around 3.3%.

Buying gilts on the secondary market may result in a profit or loss when it is sold or matures but whenever it is bought the coupon and the income remain the same

If gilts are purchased in a pooled investment then there is the added risk that the manager will make the wrong decisions in buying and selling the underlying assets.

Investment factors

In section 1 we looked at a gilt maturing in 2033 with a GRY of 5.42% and a market price of £70.08. Is this a good investment?

Let's say that an investor buys £10,000 of the 2033 Gilt.

- This would cost £7,008 as each £100 is trading at £70.08
- Interest of £43.75 would be paid every six months giving a total over the 10 remaining years of £875.
- Assuming it is held until maturity £10,000 would be repaid on July 31 2033 giving a gain of £2,992
- With the interest this is a total return of £3,867.

- This is effectively a risk free return since the UK government has never defaulted on its debt. It is though subject to inflation risk as £3,867 will almost certainly not purchase as much in 2033 as it does today.
- The market price of the gilt may rise between now and 2033 in which case the investor would have the option of selling it for an immediate profit.

This same exercise can apply to all types of bonds but if issued by a company they will be exposed to default risk.

Another factor an investor should consider is a **Bonds Duration**

Bond Duration

At some point the amount received from a bond will be the same as the price an investor paid for it. For example, if a 30 year gilt is issued with a 5% coupon, after 20 years the interest paid will be the same as the original investment. At its date of issue, it had a duration of 20 years.

At the other extreme a zero coupon bond pays no income so its duration will be its term.

Every time an interest payment is made the duration reduces because there the interest payment has paid off some of the original purchase price.

The technical term for this is the **Macauley Duration** although it is usually simply stated as the Bond's duration which represents the time it will take for future interest and possibly capital to equal the purchase price. The full definition is: *the weighted average term in years for the purchase price to be repaid by cash flows (coupon) and redemption value.*

The calculation involves a rather fearsome looking equation. It's unlikely you'll be asked to calculate it but you must know what it measures and its significance.

A Bond's duration shows how sensitive the market price is to a change in interest rates. The higher the duration the more sensitive it is to interest rate changes.

The two factors that determine a bond's duration are its remaining term and coupon.

- A long term to redemption tends to give a high duration, a shorter term a lower duration.
- A high coupon tends to give a low duration and a low coupon a higher duration.

Here is an example of this using two gilts paying the same coupon of 4.25% with one maturing in June 2032 and the other in December 2055.

On December 20 2021 the prices and duration were as follows:

Maturity date	Price	Duration
2032	£134.65	8.81
2055	£197.18	22.17

The 2055 gilt had a higher duration because the term is longer.

Interest rates have risen since 2021 and the price on July 4 2023 together with the percentage fall were

Maturity date	Price	Percentage fall
2032	£99.32	26.32%
2055	£98.12	50.24%

Both have fallen but the 2055 has fallen further because it had a higher duration

Next let's look at two gilts both maturing in 2028 but with different coupons, one paying 6% and the other 0.125% On December 20 2021 their durations were:

0.125% Duration 4.44
6% Duration 4.75

Lower coupons will have a longer duration than a higher coupon with the same remaining term.

The probable change in a Bond's price following a 1% change in base rate can be calculated by finding out the Bond's **Modified Duration**.

The formula is

Macauley duration
1 + Yield to redemption

If the Macauley Duration is 12 and the YTR is 5% the modified duration is:

$$\frac{12}{1 + 0.05} = 11.43$$

Note that in the calculation, YTR is expressed as a decimal so 5% becomes 0.05 and 4.2% would become 0.042.

The answer tells us that if there was a 1% change in interest rates the price would change by 11.43%. Remember that if rates rise this will push the price down and if they fall the price will rise.

The formula does not necessarily produce the exact change in the price of a Bond since a change in interest rates is only one of a number of factors that need to be considered.

However, a Bond's duration is the key to understanding its potential volatility. If the main concern is avoiding capital loss bonds with low duration should be chosen. If this is not a concern (or aiming for a rise in value) bonds with a high duration should be selected. Of course a gilt portfolio should contain a mixture of short and long duration bonds.

Indexed Linked Gilts

Besides conventional gilts the UK government also issues indexed linked gilts. With these:

- The interest received at each payment is determined by a fixed rate (the coupon) plus the change in RPI since the gilt was issued.
- The redemption value will also be determined by the rise in the RPI since its issue.

Put another way the main difference between indexed linked and conventional Gilts is:

- With conventional Gilts the amount of future income is known but not the real income after inflation.
- With indexed linked Gilts the amount of future income isn't known but you know you will get a real rate of return

Here's an example of two gilts, one conventional, one index linked with roughly the same maturity date (source Tradeweb)

June 9 2020

	Maturity	Coupon	Clean Price	Yield to Redemption
Conventional	Sep 2034	4.5%	£154.71	0.51%
Indexed Linked	March 2034	0.75%	£156.68	-2.63%

July 2023

	Maturity	Coupon	Clean Price	Yield to Redemption
Conventional	Sep 2034	4.5%	£98.61	4.66%
Indexed Linked	March 2034	0.75%	£98.28	0.92%

- Both have fallen in value since 2020.
- The coupon of the indexed link is lower because the payment will have an indexation factor to increase each payment.
- The YTR on the indexed linked for both dates is negative. This may seem illogical as you are paying the government rather than them paying you but indexed linked gilts

are very popular with final salary schemes who are prepared to make a loss in return for a steady stream of indexed linked payments.

The choice an investor faces in deciding which one to buy depends on their view of future inflation. The breakeven point is the difference between these two yields .

In 2020: 0.51% less -2.63% = 3.14%.

In 2023: 4.66% less 0.92% = 3.74%

This means if an investor believes the average rate of inflation is going to be greater than the difference in yield between now and 2034 you would go for the indexed linked one. If you believe it will be lower the conventional one should be chosen.

In 2023 if an investor believes that inflation will be higher than 3.74%, the indexed linked should be chosen.

It is estimated that about a third of UK gilts are index linked and this means the cost of paying the interest on these increases as inflation rises. With a conventional gilt the cost of servicing the debt reduces in real terms as the interest is fixed.

Calculating the interest payments and capital repayment

This is quite technical and although it has only been tested once you should at least understand the principles. If you want more information full details are shown in an appendix at the end of this part

Non UK Sovereign Debt.

All Governments issue bonds. These may offer higher yields than the UK but are subject to additional risks.

If the currency is in anything other than UK £ then there is currency risk which may work for or against the investor.

There is also default risk. If a country issues bonds in its own currency it can, if all else fails, print or create more money to pay off the bond holders. This though would lead to inflation and devalue the real value of the bond.

If it borrows in another currency such as the US Dollar or doesn't have its own currency as in the Eurozone then default is possible. Alternatively, the bondholders could be offered a "haircut", that is the amount of money they are owed could be reduced by a set percentage.

Whilst countries can default they cannot go into liquidation. If a company defaults the bondholders may get something back when all the assets are liquidated. There is no such provision for sovereign debt holders as they cannot take over any of the country's assets nor

can they take over the running of the country. Neither can non bondholders take legal action against a country to “wind it up” which is an option for corporate bondholder

Corporate Bonds

These are issued by companies as a way of raising capital. As with Gilts, bondholders have a right to receive the coupon plus return of their capital at the end of the term. Unlike the UK Government, companies can fail so there is default risk. Therefore:

- Coupons are generally higher than Gilts. The greater the default risk, the higher the coupon that must be offered.
- Terms are generally shorter with the maximum being usually 10 years.

Historically in the UK issuers of CBs have tended to go to the institutional market such as banks or insurance companies. Recently there have been issues aimed primarily at the individual investor.

Bonds can be **secured** or **unsecured**. Secured bonds are a lower risk than unsecured since if the company defaults, the secured asset can be taken.

Secured bonds are often referred to as **Debentures**. They can have a fixed charge, that is there is a specific asset, or a floating charge where it is held over any unsecured assets of the borrower

Convertible loan stock is a bond which offers the chance to convert to shares. This will probably mean that it trades at a higher price than an ordinary loan stock.

Permanent Interest Bearing shares (PIBS) are a form of corporate bond issued by a building society. If the BS converted to a PLC, they come **Perpetual Subordinated Bonds (PSBS)** Both are undated and the borrower is under no obligation to repay the debt which means they are very susceptible to changes in interest rates. They rank behind other depositors and creditors and do not qualify for compensation under FSCS if the bank goes into liquidation

Dating from the time when it was a Building Society there is a Halifax Perpetual Subordinated Bond that has a coupon of 9.375%

On December 13 2020 the market price was £141.35 so the yield was 6.63%. There is no YTR because it has no redemption date (**Perpetual**)

This Bond has a few more gizmos. **Subordinated** means that other debts must be repaid before this one. It is also **cumulative** which means if an interest payment is missed it must be made up in future years. It also has no **call date** which means the borrower cannot repay all the bonds at the par price of £100

All corporate bonds are subject to default risk. As an alternative to default the company may offer the bond holders the option of converting the bonds into shares. This means they lose the security of the loan being repaid for the uncertainty of future profits. Another option is to

offer the bondholders a “haircut”, that is the borrower reduces the amount that will be repaid at redemption is reduced by a percentage. In other words, rather than being paid £100 at redemption only £80 is paid. That would be a 20% haircut.

Zero coupon Bonds

These do what they say on the tin. They pay no interest but offer a fixed amount at a set point at a set future date. At issue they are offered at a discount so an investor might be offered £1 in five years time in return for 80p now. The return is not guaranteed. The final payout may be less than £1 or even 80p but whatever happens bondholders will not receive more than £1. A key measure will be the **hurdle rate**, which is the rate of return that must be achieved to pay the promised amount at maturity.

These are tradeable on an exchange so can be bought and sold before maturity.

Retail Bonds

These are bonds corporate bonds primarily issued to retail investors. They are tradeable on a recognised exchange.

Mini Bonds

A recent development has been the introduction of mini bonds. They are issued by small companies and other institutions as a way of raising capital. The coupon may look very attractive but they should be viewed with extreme caution as there are a number of inherent risks. If they are classed as a **speculative mini bond**, that is they are issued to raise money to lend to a third party or invest in other companies or property, they cannot be promoted to consumers unless they are sophisticated or have a high net worth.

Liquidity risk

They are not tradeable on any exchange so investors are locked in until maturity.

Regulatory risk

The company issuing the bonds does not have to be regulated by the FCA to issue the bonds. On its website the FCA states that whilst companies can use minibonds to legitimately raise funds, investors should be very careful when considering buying them.

Default risk

Whilst all corporate bonds have a risk of default this is probably much higher with mini bonds. A recent example of this was London Capital & Finance.

This company, which was FCA authorised, offered minibonds paying interest up to 8%. It raised more than £273 million between 2013 and 2018 before the FCA intervened in December 2018 to freeze its bank accounts.

Taxation of Bonds

Interest from bonds is classed as **savings income** and taxed after non-savings income but before dividend income. Bond interest could make use of the **Personal Savings Allowance (PSA)** as well as the 0% starting rate of tax. Directly held bonds are not subject to CGT but any losses cannot be used to offset gains in other investments.

Assuming the PSA has already been used **the Net Yield to Redemption** would be calculated as follows.

Jack pays £11,000 for £10,000 nominal stock that will mature in 5 years time. The coupon is 4% so every year he will receive £400

However, these are paid gross so if he is a higher rate tax payer he will only get £240 each year after paying income tax.

If we link this to £100 of nominal stock he would be getting a net return of 2.4%.

The normal gross yield to redemption calculation is then carried out but changing the coupon to the net rate (he paid £110 for £100 nominal stock)

$$(2.4/110) + \frac{(10/5)}{110} \times 100 = 0.36$$

That concludes this part so you should now understand:

- Understand the role of Bonds in a portfolio
- Understand the risks of holding Bonds
- Know the different types of Bonds that are available
- Understand how UK indexed linked gilts work.
- Know the main features of Corporate Bonds, zero coupon bonds and mini bonds
- Know the taxation of bonds.

Appendix: Calculating the interest and capital payments of an indexed linked gilts

First there is a difference in these gilts that were issued before 2005 and those issued from 2005 onwards. Pre-2005 bonds have an eight month indexation lag and the post 2005 a three month lag. More significantly the way in which the interest payments and capital redemption are quite different.

Pre-2005 Gilts

The amount of each six monthly payment is determined by the:

- Coupon
- The RPI when the Gilt was issued
- The RPI eight months before the payment date.

The formula is

Coupon/2 x RPI at payment date/RPI when issued.

The outcome of this formula is the payment per £100

The 4 $\frac{1}{8}$ 2030 index linked gilt was issued in June 1992. It pays the interest in January and July. The calculation for the income payment in July 2017 is as follows.

RPI June 1992	135.1
RPI May 2016	262.1

$$\frac{4.125}{2} \times \frac{262.1}{135.1} = 2.062 \times 1.94 = \text{£}4.00 \text{ per } \text{£}100 \text{ nominal holding}$$

A separate calculation will be carried out for each 6 monthly payment.

The redemption value in July 2030 will be calculated by this formula:

£100 x RPI 2029/RPI October 1991

Post 2005 Gilts

The payments for these are based on the RPI three months before payment date. The process is more complex since it uses the RPI at exact date of payment rather than the monthly RPI figure set three months earlier. This is called the **reference RPI**. It is very unlikely that you will be asked to calculate this and the figures should be given to you in the exam.

The reference RPI at payment and repayment date are used to calculate the **index factor**.

The formula is **index factor = Reference RPI at payment date/Reference RPI at date of issue** and calculated to five decimal places.

This is then used to calculate the six monthly payment using the formula:

Coupon/2 x Index factor

A Gilt is due for payment on August 5.

The reference RPI on payment date is 192.02581

The reference RPI on issue date was 173.77419

The coupon is 2.5%

The index factor is $192.02581/173.77419 = 1.10503$

The payment for each £100 is

$2.5/2 \times 1.10503 = \text{£}1.381288$ (it is worked out to 6 decimal places!)

The Redemption payment would be $\text{£}100 \times \text{Index factor}$ at redemption date.