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**Bonds - The Price of a Bond Part 1**

This topic - on the price of bonds – is actually split into two parts and it will enable us to start our exploration of bond trading in the secondary market. In this first part you'll explore:

- The price of a bond is a percentage. What does this mean?
- Trading the 'clean' price of a bond
- Coupon accruals
- The invoice or 'dirty' price of a bond

So, let's get started by looking at the secondary market.



## The Secondary Market

The ‘Secondary Market’ is the market in which all bonds trade once the initial primary market issue has taken place. It is in this secondary market that the price of a bond is important for bond investors. We need to understand the quoted price for a bond known as the clean price. In this first topic we begin by showing you how to calculate the cash equivalent of the clean price of the bond. When you buy a bond the amount that is actually paid is an invoice amount based on the ‘dirty price’ of the bond. This introduces the coupon accrual process and will explain why the investor pays the dirty price for a bond rather than just the clean traded price. We’ll look at the terms ‘clean’ and ‘dirty’ in the following pages.

The objective of this first tutorial on bond pricing is to help you understand the prices quoted for bonds and how the price is applied to a trade to calculate an invoice price. In the next tutorial on bond pricing we will look at the main reasons why bond prices are continually subject to change.

First of all, let’s take a look at prices quoted for bonds.



## The price you see on a trading screen is a percentage. What does this mean?

The bond price you see on a trading screen is a percentage price. It is applied as a percentage of the face value of the bond. Let's look at some examples to illustrate this calculation.

You buy a bond with a face value of USD100,000. The offer price quoted in the market is 105.49. This is known as the clean price of the bond. All buy and sell trades are based on a bid/offer clean price. There is also a dirty price for a bond that we will explain later in this tutorial.

So, based on this clean price how much do we pay? It would be USD 100,000 times 105.49% which is 105,490 USD. When a bond is trading above 100% of its face value we refer to it as trading at a *premium to par*.

Suppose the clean price had been 94.51. We would have to pay USD 100,000 (the face value of the bond) times 94.51% which is USD 94,510. When a bond is trading below its face value we refer to it as trading at a *discount to par*.

In practise, a bond will never trade at 100% of its face value. Even at the point of issue it is likely to have a slight variation from 100% meaning that paying the exact face value of a bond will probably never happen.

Let us look at one more example of this principle to make it absolutely clear.

Using the same prices let us assume that the face value of the bond is now 150,000 USD. This means that the amounts we pay would be:

150,000 x 105.49% which is 158,235.00 USD

Or

150,000 x 94.51% which is 141,765.00 USD

The rule is, multiply the *face value* of the bond by the *clean price percentage* to arrive at the cash value.



## Clean and Dirty prices

We have seen that the bond investor pays the clean price when they buy a bond. However, the investor has also got to pay for the current accrued coupon on the bond. What does this mean? Once again let's work through an example to explain the process:

On the 1st December 2016, (what we call the settlement date in the bond market), we decide to buy the bond shown here with a face value of 100,000 dollars. The clean price is 101.98%. However, we also have to pay the accrued interest since the last coupon was paid on 20th June 2016.

Our broker advises us that the accrued coupon is 2.24% and that the dirty price of the bond is, therefore, 104.22%. That is the clean price of 101.98% plus the accrued interest of 2.24%. To buy this bond we therefore have to pay 100,000 dollars times 104.22% which is a total of 104,220.00 dollars.

Issuer:	U.S. Treasury
Last coupon date:	20.06.16
next coupon date:	20.12.16
Maturity date:	20.12.26
Settlement:	01.12.16
Coupon rate:	5.000%
Face value:	\$100,000
Clean price:	101.98%
Accrued interest:	2.24%
Dirty price:	104.22%

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Settlement:	01.12.16
Coupon rate:	5.000%
Face value:	\$100,000
Clean price:	101.98%
Accrued interest:	2.24%
× Dirty price:	104.22%
	\$104,220



## Coupon accruals

What exactly is the accrued coupon on a bond?

To understand this we need to know who owned the bond and when. We bought this bond on 1st December 2016 so on that date it belongs to us but someone else owned it before that date and will expect to get the value of any coupons up to the 1st December.

This is a US Treasury bond so the coupon of 5.00% is split into two equal payments of 2.50% and paid twice per year on 20th June and 20th December.

The last coupon of 2.50% was paid to the previous owner of the bond on 20th June 2016. The previous owner of the bond was still holding the bond and earning the coupon for the period from 20th June, the date that the last coupon was paid, until 1st December when they sold the bond to us.

That is 164 days. However, the whole of the next coupon for 2.50% will be paid to us as the new owners of the bond on the 20<sup>th</sup> December even though we will have owned the bond for only 19 days from 1st December until 20th December. Therefore, we owe the previous owner 164 days worth of coupon and they will expect to receive it.

So how did we get to an accrued coupon payment of 2.24% in the example?

It is actually a very simple calculation:

2.50% times 164 days, divided by the total number of days between 20th June and 20th December - which is 183 days - is 2.24%.

Let's just summarize this - We buy the bond at a clean traded price but we pay the dirty price of the bond which includes the accrued coupon interest.

## Summary

So let's review what we learnt on the course:



The price of a bond is quoted as a percentage of par. To find the cash value of a bond trade we multiply the face value of the bond by the quoted price percentage.



The clean price of a bond is its quoted percentage price. The settlement price of a bond includes both the clean price and the current coupon accrual to create a dirty price which is the invoice price for a bought bond.

Let us now move on to part two of our exploration of bond prices and look at the main reasons why bond prices are always subject to change.