Trading in Treasury Bond Futures Contracts and Bonds in Australia

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Treasury bond futures are a key financial product in Australia, with turnover in Treasury bond futures contracts significantly larger than turnover in the market for Commonwealth Government securities (CGS). Treasury bond futures contracts provide a wide variety of market participants with the ability to hedge against, or gain exposure to, interest rate risk. This article discusses some of the features of the Treasury bond futures contract, and how the contract is used to facilitate hedging activities and management of bond inventories by bond dealers.

Introduction

Australian Treasury bond futures are interest rate derivatives traded on the ASX 24 market. Treasury bond futures contracts in Australia differ from government bond futures contracts in most other countries in that they are not settled at contract expiry by the delivery of a security, but rather are settled in cash. The settlement amount is based on the average price of a basket of CGS on the expiry date of the futures contract. Since they are highly liquid products that trade anonymously on an exchange, Treasury bond futures are widely used by investors to hedge interest rate risk or gain interest rate exposure. However, many participants replace this initial interest rate exposure with a position in a physical asset, such as CGS or another bond, through 'exchange for physicals' (EFP) trading. In an EFP trade involving a bond, one party buys the bond and sells an offsetting position in futures contracts referencing that asset to the same counterparty.

Characteristics of Treasury Bond Futures Contracts

A bond futures contract is a standardised, exchange-traded derivative contract to buy or sell bonds of a particular maturity on a future date for a price that is agreed today. When an investor takes a position in the market by buying a futures contract, the investor is said to have a *long* position. Conversely, if the investor's opening position is the sale of a futures contract, the investor is said to have a *short* position.

The Australian Treasury bond futures market consists of contracts representing two bond maturities: three years and ten years (Table 1). Consistent with most financial futures contracts, bond futures contracts expire in March, June, September and December. This means that at a predetermined time in the contract expiration month, the contract expires and a price for settlement of the contract is determined by the exchange. Contracts are created around six months before expiration, so there are typically two bond futures contracts available for each bond maturity. The settlement price that is determined by the exchange is based on the value of a hypothetical bond with a coupon of 6 per cent per annum (determined separately for 3- and 10-year maturities) (ASX 2013).

In determining the price of the hypothetical bond, ASX references a basket of CGS bonds, with the bond basket selected and announced by ASX before the contract is created.[1] ASX specifies the design of the

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1 For example, the 3-year bond futures basket expiring in September 2014 is composed of CGS that mature in February 2017, July 2017 and January 2018.

Table 1: Characteristics of Treasury Bond Futures Contracts

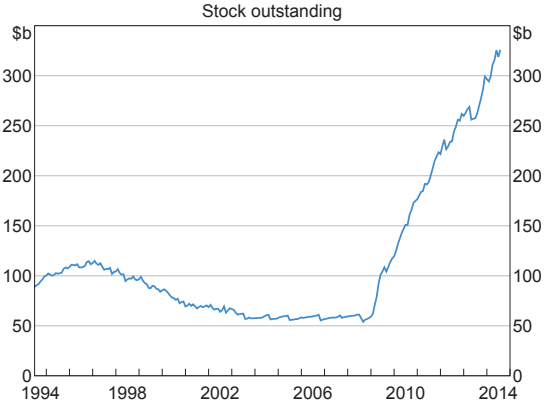
Bond maturity	3 and 10 years
Contract unit	Face value of $100 000 with a coupon of 6 per cent per annum
Contract months	March, June, September and December
Reference basket	Specified by ASX
Last trading day	Fifteenth day of the contract month
Settlement price	The price of a bond paying a 6 per cent annual coupon with a yield corresponding to the average yield of the underlying reference bonds
Settlement day	The business day following the last day of trading
Settlement method	Cash settlement only
Maximum number of open positions at expiry	28 500–37 500 contracts

Source: ASX

Treasury bond futures contract, such that there are at least three bonds in each basket and that the average term to maturity of the basket is close to the stated maturity of the futures contract. This enables the contract to be used as a hedge against several CGS bonds. As the bond futures price is a composite of the underlying bonds, the basket structure ensures that concentrated positions in individual securities do not unduly affect the pricing of the futures contract. This consideration was particularly important during much of the 2000s, when CGS on issue was low (Graph 1).

As noted previously, Treasury bond futures contracts are settled in cash rather than by the delivery of securities in the reference basket. On the contract expiration date, the final settlement yield is determined by reference to yields for the CGS contained within the relevant 3- and 10-year bond baskets. The average indicative yield of the reference bonds underlying the contract is taken at 9.45 am, 10.30 am and 11.15 am based on live market prices from recognised electronic trading venues (ASX 2014a). Prior to the September 2014 expiry, ASX based the settlement price on a survey of eight price makers in the CGS market. Survey participants each submitted the price at which they would buy and sell the basket of bonds for that contract month, with the two lowest and highest buying and selling quotes excluded from the calculation of the trimmed mean.

Graph 1
Commonwealth Government Securities
Stock outstanding



Source: AOFM

In other jurisdictions, bond futures contracts are typically deliverable (Table 2). This means that if a bond futures contract is held until expiry, the buyer must take delivery of any security in the reference basket (the seller of the contract chooses which security to deliver). Conversion factors are specified by the exchanges for each of the bonds in the reference basket with a view to market participants being indifferent as to which bond is delivered. However, because of the different durations of the deliverable bonds, these conversion factors never fully achieve this aim and one security becomes the cheapest-to-deliver (CTD) bond and is generally delivered at expiry.

Table 2: Settlement Conventions of 10-year Government Bond Futures Contracts

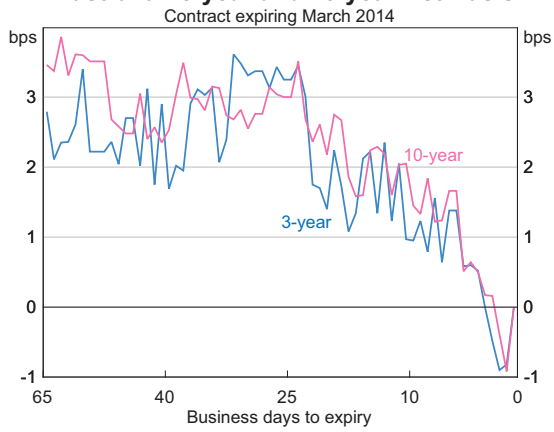
	Settlement convention
US Treasury note futures	Physical delivery
Japanese government bond futures	Physical delivery
Euro-Bund futures	Physical delivery
UK Gilt futures	Physical delivery
Australian Treasury bond futures	Cash settlement

Sources: ASX; Bloomberg

Since 2004, ASX has applied position limits to bond futures contracts in the period prior to contract expiry in order to minimise the likelihood that position concentration leads to market disorder at expiry. These expiry concentration position limits apply to the maximum number of net open positions in bond futures contracts that can be held by an investor (defined at an aggregated, corporate group level) from the close of trading on the day prior to expiry until the expiration of the contract. In March 2014, ASX increased these position limits by 50 per cent for both the 3- and 10-year bond futures contracts, mainly reflecting the increase in the amount of CGS outstanding (ASX 2014b).

Close to expiry, the difference between the price of the bond futures contract and the average price of the underlying bond basket – known as the net basis – tends to converge to zero, so that the value of the futures contract is equivalent to the value of the underlying CGS bonds. However, the net basis can remain non-zero even in the period immediately prior to contract expiry (Graph 2). This can reflect a number of factors, including the concentration limits noted above, wide variations in the prices at which dealers are prepared to buy and sell securities in the underlying bond basket (known as the bid-ask spread), low market liquidity and/or high transaction costs (e.g. trading or custody fees, or capital charges) (Lien 2012). Internal risk limits for each institution may also limit the ability of market participants to exploit arbitrage trading opportunities.

Graph 2
Australian 3-year and 10-year Net Basis
Contract expiring March 2014



Sources: RBA; Thomson Reuters

The Futures 'Roll'

Most market participants will not choose to hold the futures contract until expiry of the contract. The majority of participants will switch from their existing holding in the expiring or 'front' contract into the 'back' contract, in order to maintain this interest rate exposure.[2] To do so, an investor in an expiring futures contract must close out its position in the front contract and simultaneously execute an offsetting trade in the back contract. The process whereby open positions in the front contract are closed out and moved (or rolled over) to the back contract is known as the futures 'roll'. Reflecting this activity, the period leading up to the expiry of a contract is typically the time when futures trading, and therefore liquidity, shifts from the expiring contract to the next contract.

The value of a futures roll is determined by comparing the prices of both the front and back futures contracts, relative to the prices implied by the baskets of bonds underlying the respective futures contracts. If the futures price differential is lower than the price implied in the underlying physical market, the futures roll is considered to be cheap. The implied price is ascertained by computing the difference between the average yield on the basket

2 The contract with the closest settlement date is called the front futures contract; the back futures contract is the one that settles just after the front futures contract.

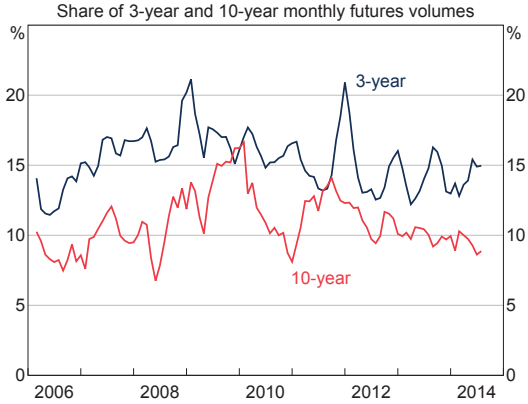
of bonds for the front contract and the average forward yield on the basket of bonds for the back contract. The use of the forward yield for the back contract reflects the need to take into account the net cost of funding the bonds until the expiry of the futures contract. Differences in the price of the front and back contracts can arise due to differences in the composition of the bond basket underlying the contract and the slope of the yield curve.

Exchange for Physical Trading

One consequence of the bond futures contract in Australia being settled in cash is that an investor wanting to convert a long futures position into an outright bond position cannot simply hold the futures contract until its expiry and expect CGS to be delivered. This means that having established their desired interest rate risk exposure in the more liquid futures market, the investor could then enter into an EFP transaction in order to take possession of the bond at the desired future date. An EFP is a bilateral transaction whereby one party buys physical assets and sells futures contracts, while the other party performs the opposite transaction. The physical asset in an EFP trade can be a debt security (such as CGS, semi-government bonds or corporate bonds) or another type of interest rate derivative, such as an interest rate swap.[3] An EFP transaction does not occur on the exchange, but is reported to ASX. Where the physical asset is a bond, EFP trading facilitates delivery of securities and, more importantly, simplifies trading between securities and futures contracts, otherwise known as basis trading.[4]

During August 2014, EFP trades represented around 10 per cent of turnover in 10-year bond futures, and 15 per cent of all 3-year bond futures turnover volumes (Graph 3). Much of the volatility in EFP volumes is associated with the quarterly futures roll.

Graph 3
EFP Trading
Share of 3-year and 10-year monthly futures volumes



Source: ASX

Market participants that wish to transact on an EFP basis must find a counterparty willing to take the other side of the EFP transaction. Usually this will be an interbank price maker in CGS, though it could be any counterparty with a futures account with which the market participant is able to transact. The market participant must execute the EFP transaction through a broker approved by the exchange.[5] The physical securities traded do not have to be the reference securities in the futures basket. Once negotiations for the exchange of offsetting physical and futures positions are complete, the trading participants must report the transaction to ASX. The futures leg of the EFP needs to be approved by ASX and is subsequently entered into the clearing process of the futures exchange, as well as being announced on the exchange. To be approved by the exchange, transaction details submitted by each counterparty must match, and the value of the offsetting physical and futures legs must be similar.

In the absence of EFP, basis trading could require trading of the entire CGS basket to replicate the futures settlement price exposure. For example, to close a basis trading position, an investor might have to buy or sell all of the relevant securities in the CGS bond basket in the secondary market. More generally, EFP trading involving bonds allows specific

3 For the full list of physical assets that can be traded against bond futures in an EFP trade, see ASX 24 Notice No 202/13, available at <http://www.sfe.com.au/content/notices/2013/notice2013_202.pdf>.

4 Basis trading is an arbitrage trading strategy that involves simultaneously trading a futures contract and holding an offsetting position in the underlying physical instrument.

5 A single trading participant can be the broker for both sides of the EFP transaction.

bonds or baskets of bonds to be traded against a single futures contract. Alternatively, a number of different futures contracts can be traded against a single bond.

While some market participants use bond futures in preference to investing in other assets to gain interest rate exposure, many use futures as a temporary source of interest rate exposure. For example, the investment manager of a fixed-income investment fund that has received a large inflow of funds could buy bond futures to efficiently gain the desired interest rate exposure; then later, unwind this position using EFP transactions to gradually establish the desired position in the underlying fixed-income securities. In addition, bond issuers (or their underwriters) can use bond futures to hedge moves in interest rates between announcing the issuance and finalising the price of the bond. In the interdealer market, EFP transactions are predominantly used for managing basis risk, which arises when there is a mismatch between the price of the bond being hedged and the price of the futures contract. For example, bond dealers may establish short futures positions to hedge the interest rate risk on their inventory of bonds. To reduce basis risk between holdings of bonds and futures, the dealer would need to enter an EFP trade to sell bonds and buy futures. In addition, bond dealers use quotes for EFP transactions to mark-to-market their end-of-day positions, since EFP quotations act as a pricing convention across which all products can be marked.

EFP use by bond issuers

Corporate issuers and state borrowing authorities can also use EFP trades as an alternative to interest rate swaps when locking in interest rates ahead of their bond issuance. If an issuer decides to raise funds by issuing a bond, an increase in interest rates between the day the issue is announced and the day the bond issue is actually priced leads to an implicit loss in the form of higher interest payments over the life of the bond (this gap between announcement and issuance may be up to one week or possibly longer). To mitigate this risk, the issuer might sell bond futures today that are equivalent to the planned issuance. On the day the issue is priced, the issuer then engages in an EFP trade with the bank (or syndicate) in charge of the sale of the bond, which would entail the bank buying physical bonds from the issuer and selling back the futures hedge. The bank would then own the issued bonds and also have a short futures position. Subsequently, the bank could then sell the issued bonds to investors, and buy futures in order to hedge this sale (either on an outright or EFP basis).

The issuer must determine the number of futures contracts that are required in order to hedge the issuance. It will aim to ensure that the dollar value of a 1 basis point change in the yield (DV01) of the issuance is matched by the DV01 of the futures contract. By equating the DV01 of the futures leg and the physical leg, the issuer is able to hedge much of its interest rate risk. The dollar change in the price of a bond (or a futures contract) for a 1 basis point change in yield can be calculated by first noting the price of the bond (or futures contract) at a given yield, and then recalculating the price given a 1 basis point change in yield. These amounts vary depending on the level of yields and the direction of the change.

While the issuer may not have a perfect hedge (owing to the lack of futures contracts on its own issuance) to the extent that changes in the yield of its own bonds move in line with changes in CGS yields, much of the interest rate risk can be hedged using Australian Treasury bond futures. For example, suppose that CGS yields have risen and that the market continues to price the corporate issuer's debt at the same margin to government securities. The rise in yields would generate an implicit loss on the corporate issuance. However, if the yield on the futures hedge has risen by the same amount as the yield on the benchmark CGS, an offsetting gain is generated for the issuer on its short futures position. On issuance, the issuer can unwind this futures leg via an EFP trade.

Managing dealer inventory

Market liaison suggests that EFP trading is most common in the interdealer market. Bond dealers execute trades by matching buyers and sellers of securities in the wholesale market. For example, should a client (such as a fund manager) wish to sell a large number of bonds, a dealer could buy these bonds for its own inventory or sell some of the bonds to other clients. Securities issued by the state governments ('semis'), for example, can be traded on an EFP basis. Although the underlying characteristics (e.g. credit risk) of semis differ from those of the CGS underpinning the Australian Treasury bond futures contract, futures are used by dealers to hedge the interest rate risk of the semis they hold in their inventory.

For example, a bond dealer may wish to reduce its position in the New South Wales Treasury Corporation (NSWTC) February 2018 bond, which has a coupon of 6 per cent. The bond dealer approaches another dealer in the market to sell the physical bond in exchange for buying futures. Suppose the NSWTC February 2018 bond is currently trading at a yield of 3.49 per cent, and the 3-year Australian government bond futures contract is currently trading at a price of 97.0 (implying a yield of 3.0 per cent). The dollar change in price for a one basis point change in yield on $10 million of the NSWTC securities is $3 683. Each contract has a DV01 of $29.95. Consequently, 123 contracts would need to be exchanged in order to hedge the sale of $10 million of NSWTC securities. The terms of the EFP transaction, from the dealer's perspective, are shown in Table 3.

In this case, the dealer has effectively reduced its position while simultaneously divesting (or squaring up) its accompanying futures hedge.

Conclusion

Well-functioning interest rate futures markets are beneficial for financial markets and the economy more generally as they facilitate the pricing of other financial instruments and the hedging of interest rate risk exposures. The characteristics of the Australian Treasury bond futures contracts are designed to deal with the relatively small size of the physical market for CGS. Treasury bond futures are widely used because they provide financial market participants with a relatively easy and cost-effective means of managing interest rate risk. EFP trading has evolved to deal with some of the idiosyncrasies of Australia's bond futures contracts, and it is commonly used by a broad range of market participants.

References

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Table 3: Stylised Example of Exchange for Physical Trade
Managing dealer inventory

Security	Trade	Coupon Per cent	Maturity	Price	Face value/ contracts	Effect of 1 basis point change in yield on price
Bond	Sell	6.00	1 February 2018	107.13	$10 million	$3 683
Futures	Buy	6.00	3 years	97.00	123 contracts	$3 683

Source: RBA