MARKET INSIGHTS

Does the Sydney Futures Exchange offer Trading Opportunities for Global CTA's?

By Professor Alex Frino and Grant Wearin
of the University of Sydney, Australia

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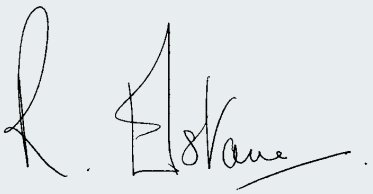
INTRODUCTION

In this second edition of Market Insights Professor Alex Frino and Grant Wearin from the School of Business at the University of Sydney examine the extent of trading opportunities the Sydney Futures Exchange offers to the global CTA community.

Their work brings clarity to some often mis-understood or unappreciated aspects of the Australian capital markets, and highlights some significant opportunities for global investors.

Once again, I commend them for the rigour with which they pursue these questions and the relevance of their research findings to the global CTA community.

Regards



ROBERT G. ELSTONE
Managing Director and CEO
SFE Corporation Limited

Sydney Futures Exchange

THE COMPANY

SFE Corporation Limited (SFE) is the holding company of the Sydney Futures Exchange, the New Zealand Futures and Options Exchange, SFE Austraclear and SFE Clearing Corporation. Sydney Futures Exchange is Australia's premier derivatives exchange and one of the ten largest financial futures exchanges in the world.SFE provides exchange-traded and over-the-counter (OTC) financial services to financial institutions throughout the Asia Pacific region and in other major financial cities in the world.

Over 45 million futures and options contracts were traded on the SFE in 2003 in the five most actively traded markets: equities, interest rates, commodities, currencies and energy.The nominal value of this trading activity exceeds A$15 trillion – significantly larger than the turnover in the Australian equity market, and second only in turnover to the Australian foreign exchange market, illustrating the vital role SFE plays in risk transfer and price discovery in the Australian financial markets.

SFE Corporation Limited is listed on the Australian Stock Exchange. (AU:SFE)

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EXECUTIVE SUMMARY

The aim of this paper is to assess whether there are new trading opportunities in SFE contracts relative to a suite of other contracts which are typically in the investment universe of CTA's. The analysis focuses on (1) liquidity, (2) price volatility and correlations in returns, and (3) the likely effectiveness of trading rules based on historical returns (eg. momentum-type trading strategies). We examine the four most liquid contracts trading on SFE, namely, 90 Day Bank Accepted Bill futures, 3 Year Treasury Bond futures, 10 Year Treasury Bond futures and SPI 200™ futures against the most liquid contracts in their respective asset classes. The key findings are as follows:

- SFE contracts are amongst the most liquid in the world in their respective asset classes, suggesting that the cost of trading these securities is likely to be quite low.
- The price volatility of SFE contracts is similar to other liquid futures contracts typically used by CTA's. Consequently, the magnitude of potential profits to be made from trading SFE contracts is similar to other contracts typically in the investment universe of CTA's.
- The correlation in price movements between SFE contracts and other contracts likely to be in the portfolios of CTA's are moderate. This implies that the addition of SFE contracts can provide new potential profit making opportunities, and can provide diversification benefits for CTA's.
- Finally, the profitability of momentum-type trading strategies typically used by CTA's, or other trading rules based on predicting price movements on the basis of historical price movements, are likely to be as profitable on SFE contracts as those typically used by CTA's.

In summary, SFE contracts appear to provide new and potentially quite profitable opportunities for CTA's seeking to enhance their performance.

A full copy of The Paper is available upon request at www.sfe.com.au

1. Liquidity

One important consideration for CTA's is the liquidity of contracts. Contract liquidity determines the average size of the bid-ask spread, which represents the minimum cost of trading futures, as well as slippage costs likely to be incurred in trading large lots. In turn, bid-ask spreads and slippage reduce the profitability of trading a particular contract and hence the attractiveness of including them in an active portfolio. It is well established that the size of bid-ask spreads and slippage costs are related to the level of trading activity in a market[1]. Hence, in order to assess the liquidity of SFE contracts, we compare their trading volume to other actively traded contracts, which are likely to be in the portfolio of major CTA's.

Futures and Options Week provides a ranking of the 25 most actively traded futures and options contracts in the world by underlying asset class. Unfortunately, these rankings are based on contract volume, which gives a somewhat inflated view of the liquidity of some of the smaller contracts. We use the data provided in *Futures and Options Week* to estimate the value of notional turnover for each contract and convert the turnover to US dollars[2]. The rankings for the top 15 contracts in each underlying asset class are reported in Table 1.

The major futures contracts traded on SFE, namely (1) 90 Day Bank Accepted Bills, (2) 3 Year and 10 Year Treasury Bonds and (3) SPI 200™ are all amongst the 15 most actively traded contracts in the world, in their respective underlying asset classes. In particular, 90 Day Bank Accepted Bills are the 6th most actively traded short-term interest rate futures, 3 Year and 10 Year Bonds are the 9th and 12th most actively traded long-term interest rate futures, respectively and SPI futures are the 11th most actively traded stock index futures. Importantly, the top 10 futures contracts include those likely to be in the investment universe of CTA's such as futures on fixed income securities and stock indexes for US, Japanese and major European markets[3]. Consequently, the statistics provided in Table 1 suggest that the liquidity of SFE's four major contracts is high relative to those typically traded by CTA's.

1 See Aitken, Frino, Hill and Jarnecic (2004), The impact of the introduction of electronic trading on bid-ask spreads, Journal of Futures Markets.

2 Notional turnover is the product of the contract size and trading volume. The nominal contract size for interest rate contracts as well as the index multiplier for stock index futures is extracted from The COMPAQ Handbook of World Stock Derivative and Commodity Exchanges and various websites. Average daily closing stock index futures prices for 2003 are used to convert volumes to turnover for stock index futures. All turnover values are converted to USD using exchange rate figures reported in the Australian Financial Review on 15 March, 2004.

3 Schneeweis, T., R. Spurgin and H. Kazemi (2003), 'Eurex Derivative Products in Alternative Investments: The Case for Managed Futures', Working Paper, University of Massachusets.

Table 1

LIQUIDITY OF SFE FUTURES RELATIVE TO THE MOST ACTIVELY TRADED CONTRACTS IN THE WORLD – 2003

Panel A: Short-term Interest Rate Futures

	Contract	Exchange	Volume	Notional Turnover (USD million)
1	Eurodollar	CME	208,771,164	208,771,164
2	3m Euro (Euribor)	Euronext	137,692,190	111,853,932
3	30d Federal Funds	CBOT	8,271,726	41,358,630
4	3m Sterling	Euronext	42,323,094	38,301,443
5	Eurodollar	SGX-DT	18,802,104	18,802,104
6	90d Bank Accepted Bills	SFE	11,435,471	8,405,344
7	3m Bankers Acceptance	ME	6,578,451	4,996,545
8	3m Euro Swiss	Euronext	5,009,460	3,955,045
9	3m Euroyen	Tiffe	4,155,800	3,748,016
10	1m LIBOR	CME	1,138,358	3,415,074
11	1d Interest Rate	BM&F	57,641,625	1,974,028
12	Euroyen TIBOR	SGX-DT	2,015,211	1,817,470
13	Interbank Equilibrium	MexDer	162,077,312	1,469,423
14	ID x US Dollar Spread	BM&F	23,791,217	1,189,561
15	3m Euribor	Eurex	503,951	408,355

Panel B: Long-term Interest Rate Futures

1	Euro-Bund	Eurex	244,414,274	19,805,062
2	10y Treasury Notes	CBOT	146,745,281	14,674,528
3	Euro-Bobl	Eurex	150,087,139	12,161,668
4	Euro-Schatz	Eurex	117,370,528	9,510,617
5	5y Treasury Notes	CBOT	73,746,445	7,374,645
6	30y US Treasury Bonds	CBOT	63,521,507	6,352,151
7	10y Japanese Govt Bond	TSE	6,465,073	5,830,694
8	Long Gilt	Euronext	10,150,267	1,837,152
9	3y T-Bond	SFE	19,246,934	1,414,696
10	2y Treasury Notes	CBOT	4,415,906	883,181
11	3y KTB	Kofex	10,275,042	878,960
12	10y T-Bond	SFE	6,705,904	492,900
13	10y Euro Swapnote	Euronext	1,031,016	186,609
14	5y Euro Swapnote	Euronext	1,022,358	185,042
15	10y Canadian Govt Bonds	ME	2,397,119	182,069

Panel C: Stock index futures

	Contract	Exchange	Volume	Notional Turnover (USD million)
1	E-Mini S&P 500	CME	161,176,639	7,768,714
2	S&P 500	CME	20,175,462	4,862,286
3	CAC 40	Euronext	29,319,624	2,964,036
4	Kospi 200	KSE	62,204,783	2,314,720
5	Dow Jones Euro Stoxx 50	Eurex	116,035,326	2,253,761
6	DAX	Eurex	27,181,218	1,762,011
7	E-Mini Nasdaq-100	CME	67,888,938	1,656,490
8	FTSE 100 Index	Euronext	20,252,114	1,482,345
9	Nikkei 225	OSE	13,058,425	1,096,210
10	Topix	TSE	9,359,047	774,856
11	SPI 200™	SFE	4,288,828	242,025
12	OMX	EDX	14,567,900	106,745
13	JSE All Share Index	Safex	8,521,365	106,401
14	S&P CNX Nifty	NSE	10,197,728	55,591
15	Sensex	SEM	11,917,450	51,084

2. Volatility and Correlation

If a security has little price volatility over an investors trading horizon, then the expected profitability from trading that security is low. Furthermore, if the returns on a security are strongly correlated with the returns on other securities (or combinations of securities) in an investor's portfolio, then it is unlikely to provide any new trading opportunities relative to the securities already in the investor's portfolio. Consequently, the following represent necessary (but not sufficient) conditions for a contract to provide a new trading opportunity:

(i) it should provide considerable price volatility over an investors trading horizon, and
(ii) the correlation in returns on the contract and other securities in the investors portfolio should be low.

In order to assess the extent to which SFE contracts are likely to provide new and profitable trading opportunities for CTA's, the price volatility of each contract is compared with other actively traded contracts in each asset class[4]. Second, the correlation coefficient between the returns on SFE contracts and the return on other actively traded contracts in the same asset class are also calculated.

4 The results in Table 2 onwards are based on contracts that are more actively traded in each asset class than SFE in both notional turnover and contract turnover terms. They are those typically traded by CTA's (see Spurgin et.al., Ibid). Returns are calculated based on contract values rather than simply quoted prices.

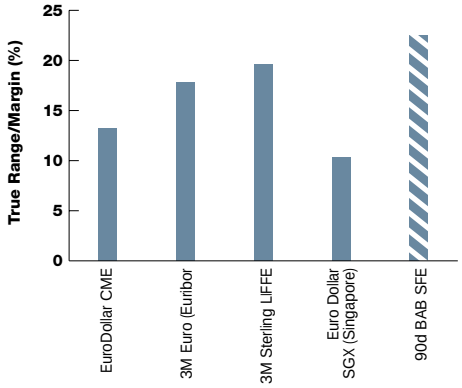
Table 2 below reports the average price volatility of SFE and other contracts based on a measure typically used by CTA's – the so-called 'true range'.[5] We have divided the true range by the initial margin for each contract to provide a comparable measure of price volatility across contracts. This measures the average maximum potential profitability or returns that can be generated from trading the contracts on a daily basis. Panel A illustrates that the price volatility of 90 Day BAB Futures is the highest in its asset class including the two Eurodollar contracts – the contracts typically used by CTA's. Furthermore, Panel B of Table 2 illustrates that the order of magnitude of price volatility of 3 year and 10 Year Bond Futures contracts is similar to volatility in other actively traded long-term interest rate futures. Finally, Panel C of Table 2 illustrates that the order of magnitude of SPI 200™ futures is similar to other stock index futures. On the balance, this analysis suggests that the profits which can be generated by trading SFE contracts is of a similar order of magnitude to profits generated on contracts typically used by CTA's.

Table 2

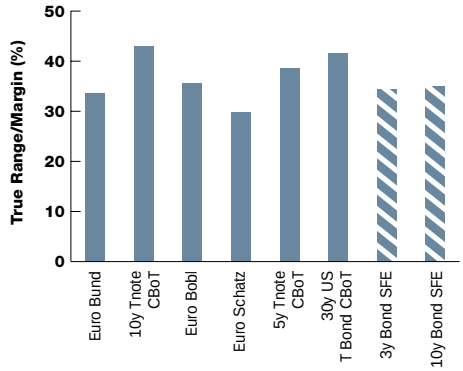
PRICE VOLATILITY EXHIBITED BY THE MOST ACTIVELY TRADED FUTURES CONTRACTS:

1 January 2000 to 31 December 2003*

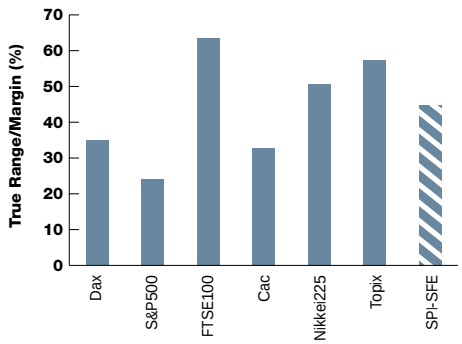
Panel A: Short-term Interest Rate Futures



Panel B: Long-term Interest Rate Futures



Panel C: Stock Index Futures



* Stock index futures volatility estimated from 1 Jan. 2001 to 31 Dec. 2003 as the first full year of trading of the SPI 200™ contract was 2001.

5 The true range is the maximum of the ($|close_{t-1}-low_t|$, $|high_t-close_{t-1}|$, $high_t-low_t$). This has been scaled by the margin for each contract.

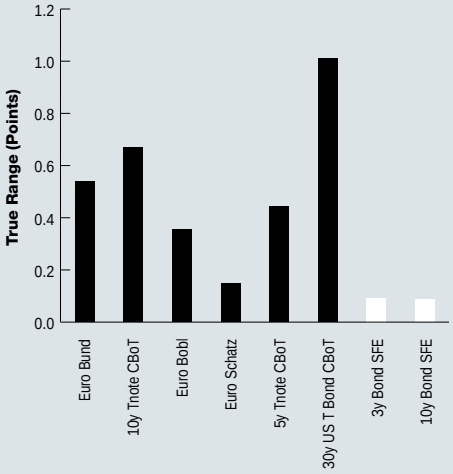
Technical Note 1:

A COMPARABLE MEASURE OF THE PRICE VOLATILITY OF SFE INTEREST RATE FUTURES

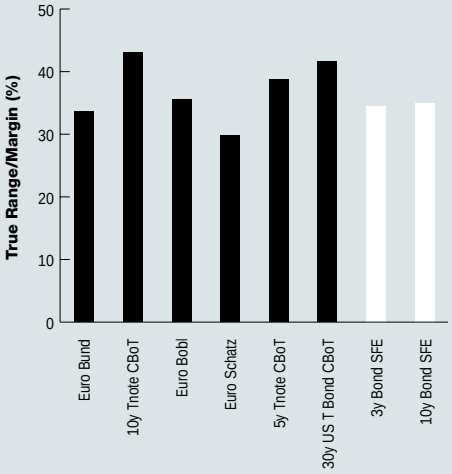
If you were to download the prices of Treasury Note futures trading on a US exchange and a Treasury Bond future trading on the SFE from an information vendor, and then calculate price volatility using the raw price series, you would incorrectly conclude that the price volatility of the SFE contracts is insignificant relative to US contracts (see Panel A in the Exhibit 1 below). The reason this is an inappropriate comparison stems from differences in the way interest rate futures contracts are quoted in Australia relative to overseas markets. Unlike interest rate futures contracts traded in the US or Europe, the interest rate contracts traded on the SFE are quoted on a yield basis. For example, the quoted price of 10 Year US Treasury Note futures trading on CBOT increased by 0.1562 to 112.1094 on the 31 December, 2003 relative to the previous close, while the quoted price of the 10 Year Treasury Bond futures on SFE decreased by 0.02 to 94.385. While for the US contract, the quoted price represents the price of the underlying bond (per $100 of face value) on SFE the quoted price represents 100 less the yield. In order to convert the SFE price to a value comparable to the US contract, you need to extract the yield from the quoted price and feed it into a discounted cashflow formula.* The value of the price change represented by the change in the price of the bond futures contract on SFE (0.02) looks trivial compared to the change in the price for US Note futures (0.1562), however they are in fact quite similar in dollar terms. For example, the value of the change in the SFE contract is 0.154319 per $100 of face value (AUD) while the value of the change in the US contract is 0.1562 per $100 of face value (USD). This implies that in order to produce a measure of volatility for SFE contracts which is comparable to overseas contracts, the value represented by the change in the quoted price of the SFE contracts needs to be calculated. Furthermore, because of the difference in currencies across contracts, in this paper, we also divide by the initial margin to get a comparable indication of the differences across contracts. Exhibit 1 below summarises the effect of making these adjustments on volatility comparisons. Quite clearly, when the comparisons are made on a comparable basis, the order of magnitude of the volatility of the SFE contracts is similar to the other contracts in the same asset class.

EXHIBIT 1 – PRICE VOLATILITY COMPARISONS BASED ON QUOTED PRICES AND CONTRACT VALUES

Panel A: Incorrect comparison – Volatility calculated using raw quoted prices



Panel B: Correct comparison – Volatility calculated after converting quoted prices to values and dividing by initial margin



* See http://www.sfe.com.au/content/sfe/products/pricing.pdf for a guide to pricing conventions on SFE.

Table 3 documents the correlation between daily and weekly returns on SFE contracts and the most actively traded contracts in the same asset class in Panel A. For comparison, the correlation coefficient with the most actively traded US futures contract in each asset class is also illustrated in Panel B. Returns have been adjusted to take into account time differentials between assets trading in different time zones.[6,7]

Panel A in Table 3 illustrates that the correlation coefficient between 90 Day BAB Futures and other actively traded futures contracts lies between 0.20 and 0.67. While the correlation is high, it is far from perfect suggesting that there are ample new profit making opportunities and portfolio diversification opportunities arising from SFE 90 Day BAB Futures. Panel B illustrates that the correlation of the short-term interest rate futures contract most commonly used by CTA's (Eurodollar contracts traded on CME) has a similar order of magnitude against 90 Day BAB, 3 Month Euribor and 3 Month Sterling futures. The low correlation between 90 Day BAB Futures and the latter two contracts illustrated in Panel A of Table 3 implies that 90 Day BAB Futures provide profit-making or portfolio diversification opportunities which are not provided by the 3 Month Euribor or 3 Month Sterling contracts.

Table 3 also reports the correlations amongst long-term interest rate futures. Panel A illustrates that correlations with returns on 3 Year Bond Futures range between 0.41 and 0.74 across contracts, while the correlation between returns on 10 Year Bond Futures and others contracts range from 0.44 to 0.78 across contracts. Again, while high, the correlation is far from perfect. Panel B reports correlations in returns with the staple contract in this asset class – 10 Year T-Bond futures contracts trading on CBOT. It suggests that SFE contracts (especially 3 Year Bond Futures contracts) has the lowest correlation with the US contract in this asset class. This implies that the SFE contracts may provide some of the best new profit making or diversification opportunities amongst the most actively traded contracts in this asset class.

Panel A of Table 3 illustrates that SPI 200™ futures contracts have correlations ranging between 0.4 and 0.7 against other futures contracts in this asset class – again high, but far from perfect. Panel B suggests that relative to the S&P500 futures contract trading in the US, the SPI 200™ futures contract generally has a higher correlation than Japanese stock index futures contracts, but a lower correlation than European futures contracts. This again suggests that SPI 200™ futures provides significant new profit-making opportunities or portfolio diversification potential.

6 For example, returns on contracts in US and European time zones have been lagged by 1 day.

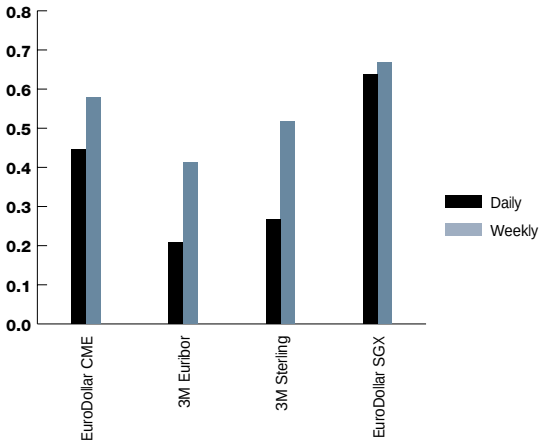
7 Analysis was also repeated on returns adjusted for currency fluctuations. While the results changed somewhat, the broad conclusions drawn from that analysis are similar to those based on raw returns.

Table 3

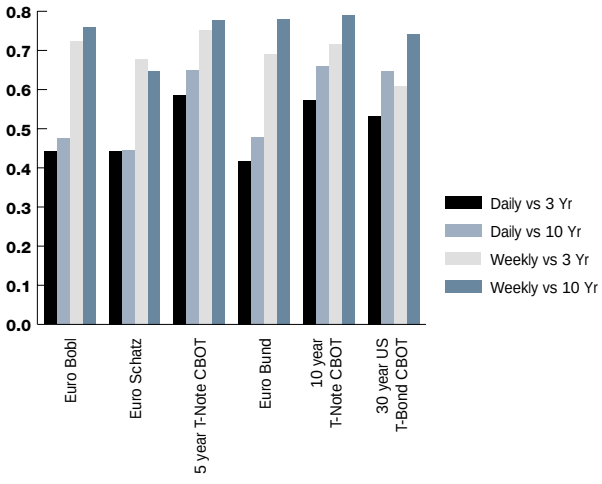
CORRELATIONS AGAINST SFE CONTRACTS AND MOST ACTIVE CME CONTRACTS

Panel A: SFE Contracts

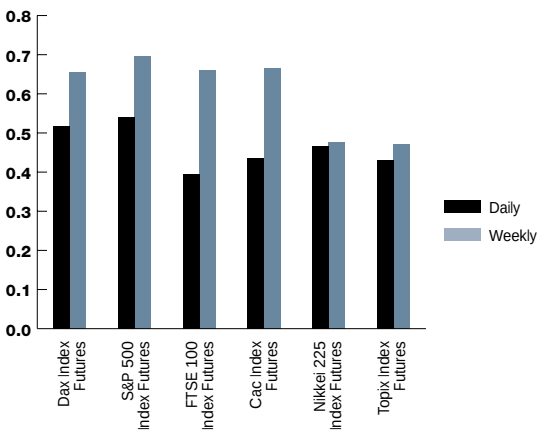
v. 90 Day BAB Futures



v. 3 and 10 Year Bond Futures

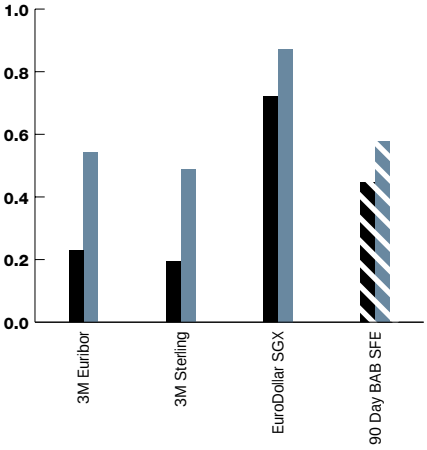


v. SPI Index futures

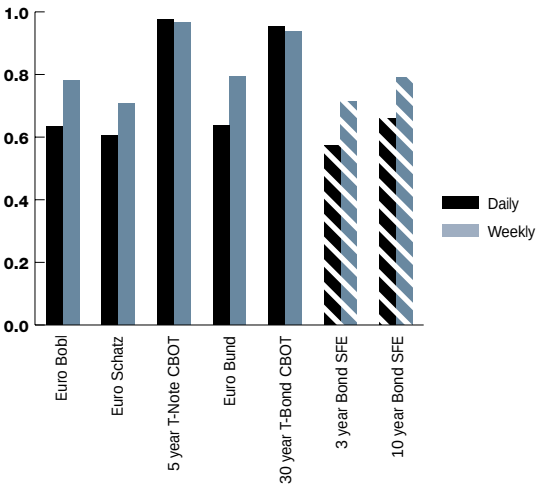


Panel B: Most Active CME Contracts

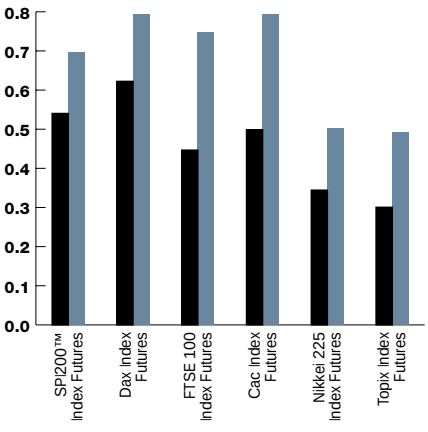
v. Eurodollar futures (CME)



v. 10 Year T-Note futures (CBOT)



v. S&P500 futures (CME)

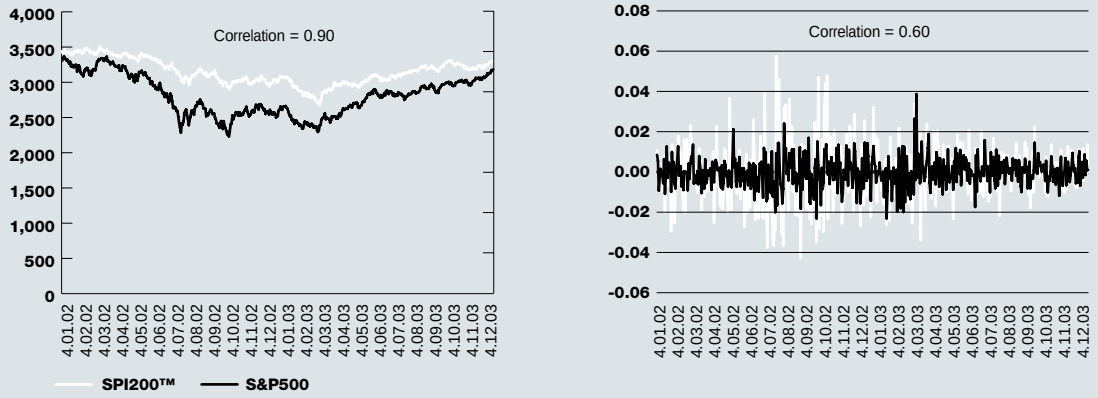


Technical Note 2:

MEASURING CORRELATION ACROSS FUTURES CONTRACTS – PRICE LEVELS OR CHANGES?

Most information vendors provide a facility for calculating the correlation in prices of different contracts. One of the choices faced by the analyst is whether they calculate the correlation coefficient on the basis of security price levels, changes or percentage changes. An understanding of this is important. For example, using data for the 2 Year period ending 31 December, 2003 produces a correlation coefficient between the price levels of SPI 200™ futures trading on SFE and S&P500 futures trading on CME of 0.90 – extremely high. However, the correlation coefficient between the percentage change in the price of SPI 200™ futures and S&P500 futures over the same period is 0.60 – moderate (even after various corrections for time zone differences). While one estimate suggests that there is little to be gained from trading SFE futures, the other suggests that there may in fact be considerable opportunities for profiting from price movements unique to the Australian contract. So what is the truth?

EXHIBIT 2 – 'STATIONARITY' OF PRICE LEVELS AND PERCENTAGE CHANGES, AND THE CALCULATION OF CORRELATION COEFFICIENTS



The answer is quite clear, if not a little complicated. The change or percentage change in prices should be used to calculate correlation coefficients. Otherwise, correlation coefficients estimated between two price series will be spurious and over-inflated. The statistical reason for estimating the relationship between changes rather than levels underpins a body of work in econometrics known as co-integration, for which Clive Granger was awarded a Nobel Prize last year. Technically, stock price indices such as the S&P500 Index are a classic example of non-stationary time series variables* – that is they drift away from their mean values for extended periods of time (see Exhibit 2). It has been proven in the statistical literature that regressing 2 non-stationary series produces spurious results. Essentially, regardless of what the variables are (eg. babies born in Sydney and stock price levels), if they are non-stationary a significant correlation coefficient will probably be calculated even if in reality there is no true relationship between the two variables. It is clear from Exhibit 2 that the percentage change in prices does not suffer from this problem.

Perhaps another, simpler rationale for using price changes rather than levels is as follows. The percentage change in prices over a day essentially measures the relationship between the returns in two contracts over a day. Hence, for an investor with a trading horizon of 1 day the coefficient indicates the benefit from adding the security to their trading universe. The strength of the relationship between the two futures provides an indication of the potential profits of trading out of one and into the other, or vice versa. Hence if the correlation is perfect, there is little point in switching investment from one to the other. However, if the correlation is less than perfect, there is a potential benefit! The correlation in price levels, apart from being over-inflated, effectively captures the return from buying and holding each security over the entire period – for our purposes here, it is inappropriate.

* see Gujarati, D., (1995), Basic Econometrics, McGraw-Hill at page 714.

3. The Likely Effectiveness of Trading Strategies Typically used by CTA's

In a recent paper commissioned by Eurex, Schneeweis, Spurgin and Kazemi (2003) examine whether standard momentum-type trading rules typically used by CTA's are profitable when applied to Eurex futures relative to other futures typically traded by CTA's.[8] According to the paper 'An x-day momentum strategy takes a long position in a futures market on date t if the total return to the contract between dates t and t-x is positive. Otherwise the strategy takes on a short position.' [p. 12]. In applying momentum rules to Eurex and other futures contracts, the paper uses 15, 27 and 55 day momentum trading rules. The problem with using this type of methodology for assessing the potential profitability from trading a contract is that it assumes the same type of strategy is optimum for different contracts. In their paper, Schneeweis et.al. (2003) compare the profitability of momentum-type trading rules applied to FTSE, NIKKEI, SP500, DAX, TSY Bond, LIBOR, BOBL and Bund futures. Implicitly, they are assuming that a momentum rule based on 15, 27 and 55 days is optimum for all these contracts.[9]

We use a more general approach in this paper to assess whether there are significant trading opportunities in SFE contracts for CTA's using trading rules based on previous price movements (such as momentum-type trading rules). We calculate the extent to which the return on a futures contract on day t is explained by the return on the contract in each of the previous 30 days. In other words, we estimate the degree of correlation between the returns on a contract and the previous 30 days returns.[10]

Table 4 opposite provides the results of this analysis. The table reports the degree of correlation between the return on day t and the return in the previous 30 days for each contract. The higher the correlation, the more predictable are the returns of the contract and the more likely it is that a trading rule based on previous returns will be profitable. Panel A of Table 4 illustrates that the BAB futures contract has returns that are as predictable as the other short-term interest rate contracts typically used by CTA's. In fact, over 2003 it is the contract with the most predictable returns. This suggests that a momentum-type trading rule or indeed any trading rule based on prior price movements is likely to be more effective for this contract than other short-term interest rate futures. Panel B of Table 4 compares the correlations for the long-term interest rate futures. The degree of correlation in returns is of a similar order of magnitude over longer time periods. However, for the year 2003, the 3 Year Bond Futures contract trading on SFE together with the Eurobond, Eurobobl and 5 Year T-Note have the highest correlation. Finally, Panel C of Table 4 reports the correlations for stock index futures. The magnitude of the correlation for the SPI 200™ is similar to the S&P500 futures contract which is typically favoured by CTA's. On the balance, these results suggest that there are significant opportunities in SFE contracts for CTA's applying trading rules based on previous returns, such as standard momentum-based trading strategies.

8 Schneeweis, T., R. Spurgin and H. Kazemi (2003), 'Eurex Derivative Products in Alternative Investments: The Case for Managed Futures', Working Paper, University of Massachusets.

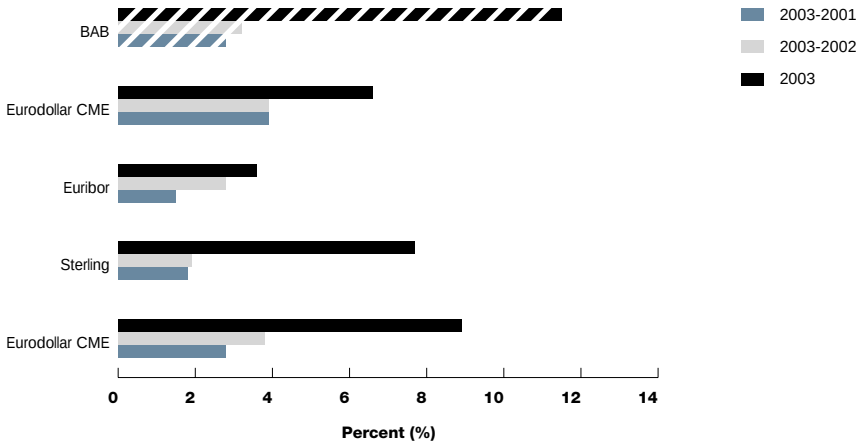
9 Unfortunately, their results could simply be interpreted as demonstrating that a 15, 27 and 55 day momentum strategy is optimum for Eurex contracts. That is, there may very-well be some momentum-based trading rule that can cause non-Eurex contracts to outperform Eurex contracts.

10 Specifically, we estimate the R-Squared statistic for the following regression equation:
$R_t = a + b_1 R_{t-1} + b_2 R_{t-2} + b_3 R_{t-3} + \ldots + b_{30} R_{t-30} + e_t$
Where R_t is the percentage change in the quoted price of the futures contract on day t.

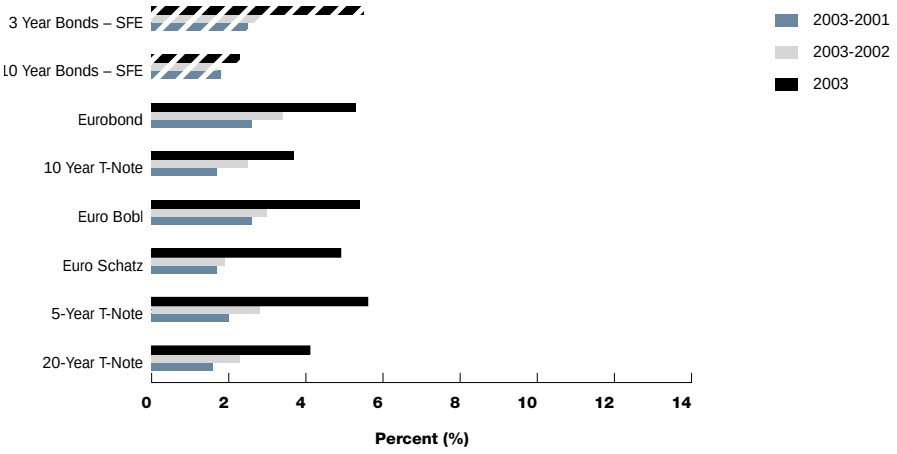
Table 4

CORRELATIONS BETWEEN RETURNS ON CONTRACT AND RETURNS IN EACH OF THE PREVIOUS 30 DAYS

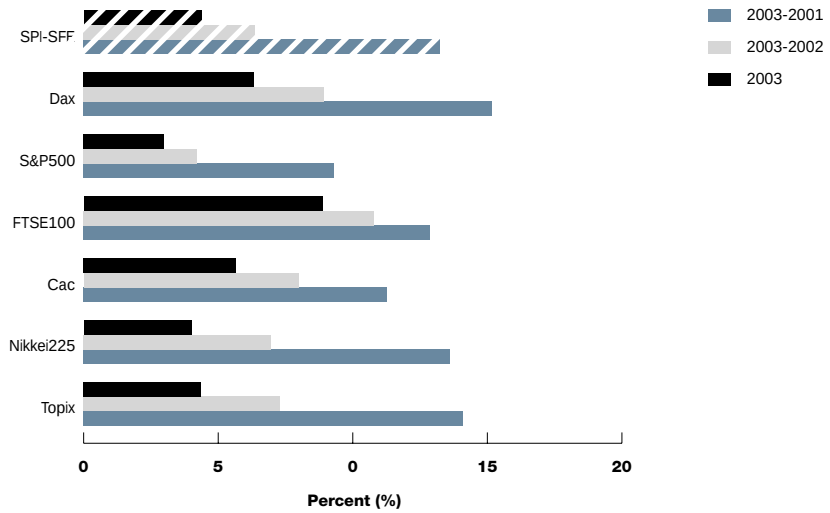
Panel A: Short-term Interest Rate Securities



Panel B: Long-term Interest Rate Securities



Panel C: Stock Index Futures



APPENDIX

Contracts Examined, contract specification and margins as at 31 March, 2004

Panel A – Short-term Interest Rate Futures

	Notional Size	Min Tick	Tick Value	Margin
EuroDollar/ CME	1 million USD	1/4 of 1 basis point	6.25 USD	810 USD
3M Euribor/ LIFFE	1 Million EUR	1/2 of 1 basis point	12.5 EUR	700 EUR
3M Sterling/ LIFFE	500,000 GBP	1 basis point	12.5 GBP	325 GBP
EuroDollar/ SGX-DT	1 million USD	1/4 of 1 basis point	6.25 USD	810 USD
90 Day BAB/ SFE	1 million AUD			600 AUD

Panel B – Long-term Interest Rate Futures

Euro Bobl/ Eurex	100,000 EUR	1 basis point	10 EUR	1,000 EUR
Euro Schatz/ Eurex	100,000 EUR	1 basis point	10 EUR	500 EUR
5 year T-Note/ CBOT	100,000 USD	1/2 of 1/32 of 1 point[11]	15.625 USD	1,148 USD
Euro Bund/ Eurex	100,000 EUR	1 basis point	10 EUR	1,600 EUR
10 year T-Note/ CBOT	100,000 USD	1/2 of 1/32 of 1 point	31.25 USD	1,553 USD
30 year US T-Bond/ CBOT	100,000 USD	1/32 of 1 point	31.25 USD	2,430 USD
3 year Bond/ SFE	100,000 AUD			750 AUD
10 year Bond/ SFE	100,000 AUD			2,000 AUD

Panel C – Stock Index Futures

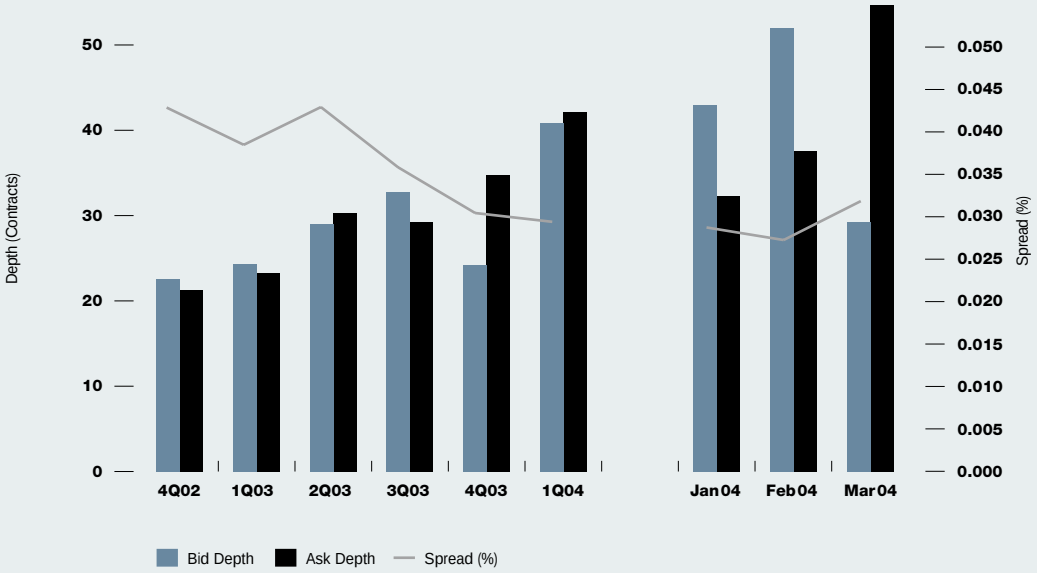
SPI Index Futures/ SFE	1 point	25 AUD	1,750 AUD
Dax Index Futures/ Eurex	0.5 points	12.5 EUR	9,000 EUR
S&P 500 Index Futures/ CME	0.1 points	25 USD	20,000 USD
FTSE 100 Index Futures/ LIFFE	0.5 points	5 GBP	1,500 GBP
Cac Index Futures/ Euronext	0.5 points	5 EUR	3,000 EUR
Nikkei 225 Index Futures/ OSE	10 points	10,000 JPY	470,000 JPY
Topix Index Futures/ TSE	0.5 points	5,000 JPY	350,000 JPY

11 Eg. 84-16 = 84 16/32 or 84-165 = 84 16.5/32

MARKET QUALITY INDICATORS

SFE SPI 200™ FUTURES

1. Transaction Cost Indicators



Transaction cost indicators continue to demonstrate an improvement in the cost of trading to 1st Qtr 2004. The market depth at the best quotes for the nearest to delivery contract in the 1st Qtr 2004 averaged around 40 contracts for both the best bid and best ask. The bid-ask spread averaged 1 tick or 3 basis points of contract value in 1st Qtr, 2004, which represents an 18 month low. Overall, the cost of trading the SFE SPI 200™ contract has been declining significantly.

2. Tracking Error

	4Q02	1Q03	2Q03	3Q03	4Q03	1Q04	Jan 04	Feb 04	Mar 04
Mean of ($R_{SPI} - R_{cash}$)									
Weekly	0.18%	0.18%	0.28%	0.13%	0.20%	0.17%	0.13%	0.11%	0.28%
Daily	0.38%	0.46%	0.48%	0.34%	0.43%	0.41%	0.37%	0.39%	0.46%
Standard Deviation of ($R_{SPI} - R_{cash}$)									
Weekly	0.22%	0.23%	0.36%	0.17%	0.26%	0.25%	0.19%	0.28%	0.29%
Daily	0.12%	0.44%	0.42%	0.38%	0.46%	0.37%	0.31%	0.36%	0.44%

Tracking error against the ASX/S&P 200 Accumulation Index appears to have generally declined in the 1st Qtr, 2004 across all measures of tracking error and on a QoQ and YoY basis. This suggests that the efficiency of synthetic exposure which can be obtained through the contract has improved.

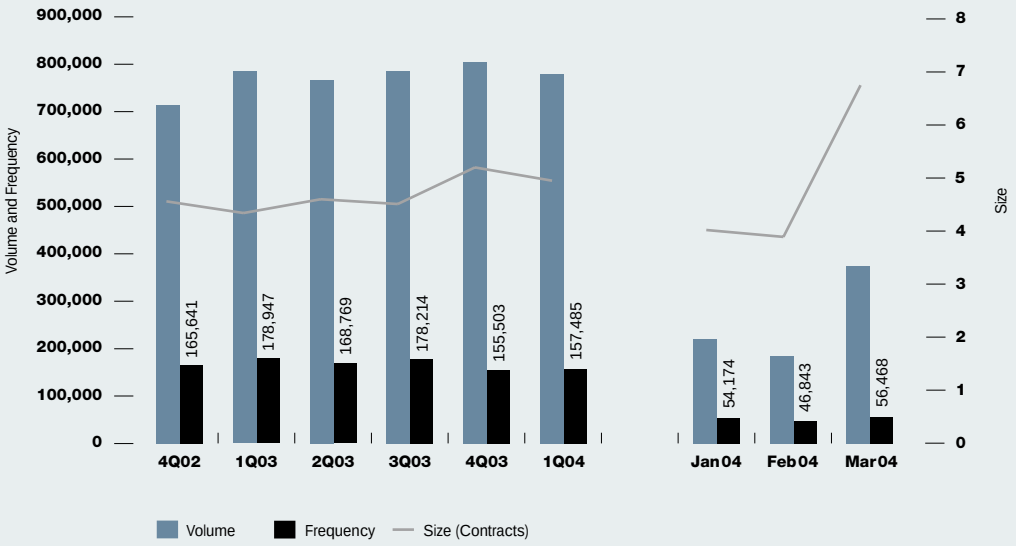
SFE SPI 200™ FUTURES (continued)

3. Volatility

	4Q02	1Q03	2Q03	3Q03	4Q03	1Q04	Jan 04	Feb 04	Mar 04
Standard Deviation of Return									
Weekly	1.474%	1.958%	1.078%	0.801%	1.061%	1.088%	1.354%	0.924%	0.856%
Daily	0.804%	1.030%	0.696%	0.530%	0.526%	0.490%	0.548%	0.388%	0.519%
Average of (high-low)									
Monthly	148.00	199.67	122.67	103.33	143.00	105.00	99.00	120.00	96.00
Weekly	72.08	79.54	63.38	51.77	53.62	50.93	56.00	48.00	48.20
Daily	28.18	29.47	24.34	21.65	21.02	20.76	23.95	17.60	20.74

Daily price volatility has generally declined over the past 18 months, although daily price volatility for the 1st Qtr 2004 is similar to the previous Qtr. The daily price range for the 1st Qtr, 2004 averaged almost 21 points (roughly $525) per contract. This daily price range is approximately 30% of the initial margin for the contract, suggesting that there are significant profit-making opportunities for traders with a short-term (daily) trading horizon.

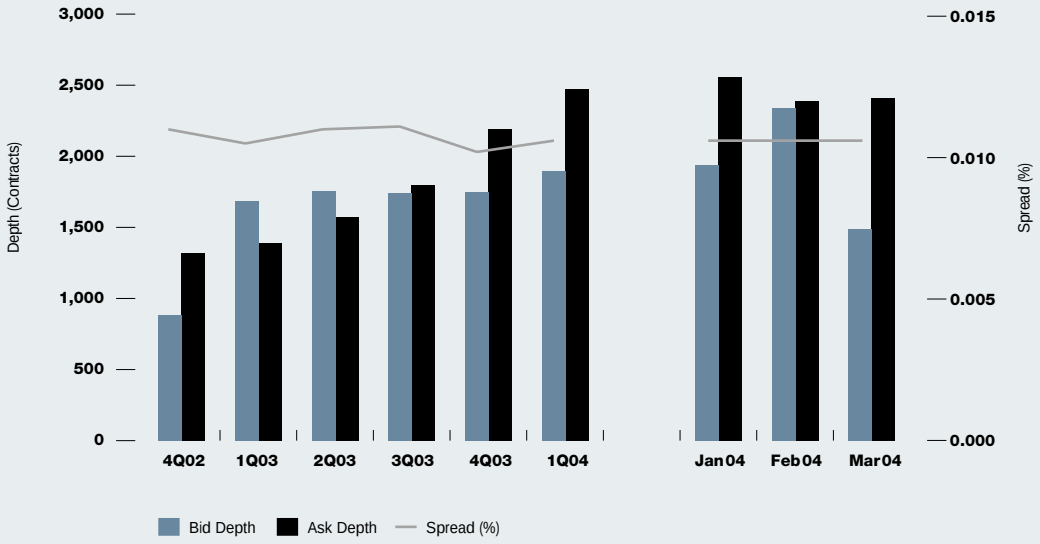
4. Trading Activity



Consistent with the transaction cost indicators, volume in the nearest to delivery contract has been generally increasing over the past 18 months and, at 779,000 contracts in 1st Qtr 2004, is close to its 18 month high of 803,000 in 4th Qtr 2003. The higher level of trading activity and lower cost of trading continues to allow market participants to execute larger trades which, at around 5 contracts, is close to an 18 month high.

90 DAY BAB FUTURES

1. Transaction Cost Indicators



90 Day BAB Futures have generally experienced improvements in the cost of trading. The average bid-ask spread of the nearest to delivery contract is slightly higher than one basis point in 1st Qtr, 2004 which is close to its 18 month low in 4th Qtr, 2003. The market depth of the contract increased strongly to 1,900 for the bid and 2,500 for the ask – both 18 month highs.

2. Tracking Error

	4Q02	1Q03	2Q03	3Q03	4Q03	1Q04	Jan 04	Feb 04	Mar 04
Mean of ($R_{SPI} - R_{cash}$)									
Weekly	0.010%	0.011%	0.014%	0.008%	0.010%	0.008%	0.012%	0.006%	0.006%
Daily	0.005%	0.005%	0.006%	0.003%	0.004%	0.004%	0.005%	0.002%	0.004%
Standard Deviation of ($R_{SPI} - R_{cash}$)									
Weekly	0.013%	0.017%	0.029%	0.011%	0.014%	0.007%	0.009%	0.003%	0.008%
Daily	0.007%	0.008%	0.014%	0.005%	0.006%	0.005%	0.006%	0.003%	0.006%

The tracking error of 90 Day BAB Futures returns against 90 Day BAB yields is very tight and has generally been around 1 basis point or less over the past 18 months. This implies that 90 Day BAB Futures are increasingly effective in hedging against movements in short-term rates.

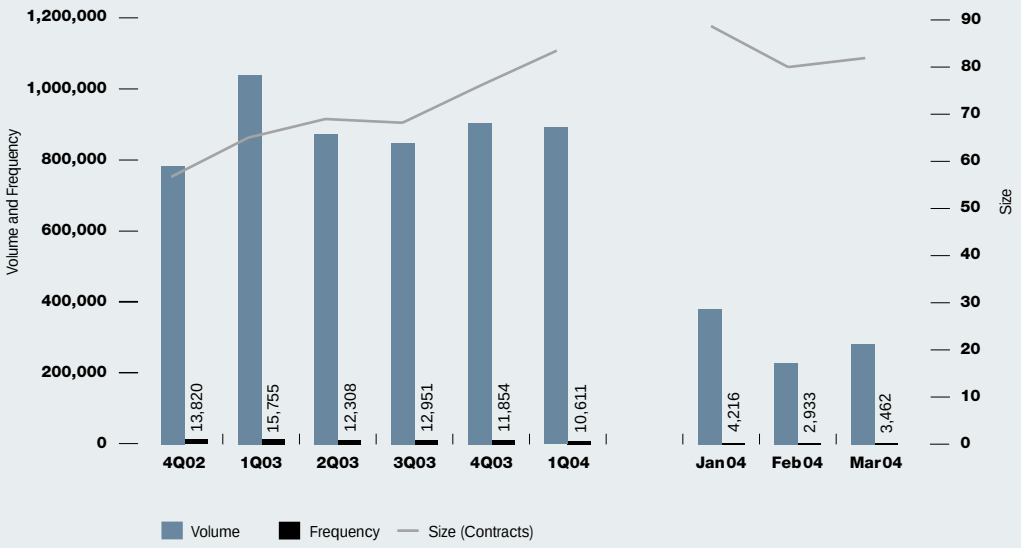
90 DAY BAB FUTURES (continued)

3. Volatility

	4Q02	1Q03	2Q03	3Q03	4Q03	1Q04	Jan 04	Feb 04	Mar 04
Standard Deviation of Return									
Weekly	0.02%	0.02%	0.02%	0.01%	0.02%	0.019%	0.029%	0.013%	0.017%
Daily	0.008%	0.008%	0.009%	0.007%	0.009%	0.009%	0.011%	0.006%	0.010%
Average of (high-low)									
Monthly	0.25	0.20	0.28	0.23	0.27	0.19	0.22	0.13	0.23
Weekly	0.10	0.10	0.11	0.10	0.11	0.09	0.09	0.07	0.10
Daily	0.04	0.04	0.03	0.03	0.04	0.04	0.04	0.03	0.04

The price volatility for the nearest to delivery 90 Day BAB Futures contract has remained quite constant over the past 18 months. For example, the daily price range in 1st Qtr, 2004 was 4 basis points (approximately $100). The daily range was approximately 16% of the initial margin for the contract, which suggests that there are profitable trading opportunities for short-term (intraday) traders.

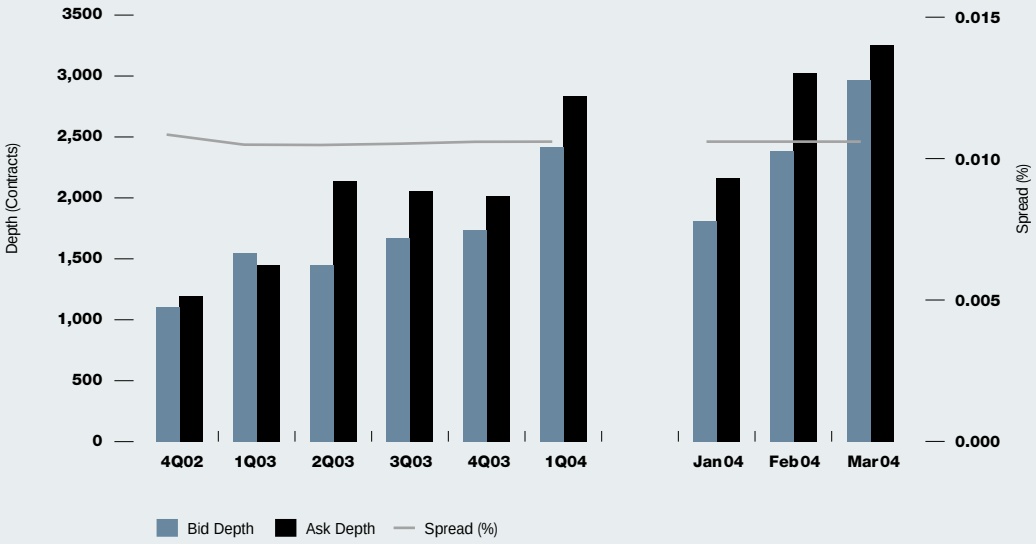
4. Trading Activity



90 Day BAB Futures volume is very high and has remained at similar levels over the past year, roughly yielding 800,000 contracts per quarter in the nearest to delivery contract. The continual improvement in transaction costs and liquidity of this contract is also evident in the strong growth in the average trade size over the past 18 months, and more specifically in 1st Qtr, 2004. At almost 80 contracts in 1st Qtr, 2004 the average transaction size is at an all time high for the BAB.

3 YEAR BOND FUTURES

1. Transaction Cost Indicators



Transaction cost indicators show continual improvement in the cost of trading 3 Year Bond Futures contracts. While the bid ask spread of the nearest to delivery contract has remained relatively constant at 1 basis point of contract value over the past 18 months, there has been considerable improvement in market depth quoted at the best price, especially in the 1st Qtr, 2004. The average depth of market averaged around 2,400 on the best bid and 2,900 on the best ask in 1st Qtr, 2004 – both are 18 month highs.

2. Tracking Error

	4Q02	1Q03	2Q03	3Q03	4Q03	1Q04	Jan 04	Feb 04	Mar 04
Mean of ($R_{SPI} - R_{cash}$)									
Weekly	0.12%	0.12%	0.16%	0.12%	0.10%	0.07%	0.07%	0.07%	0.08%
Daily	0.05%	0.05%	0.04%	0.04%	0.04%	0.02%	0.02%	0.02%	0.02%
Standard Deviation of ($R_{SPI} - R_{cash}$)									
Weekly	0.12%	0.14%	0.18%	0.18%	0.12%	0.04%	0.04%	0.05%	0.04%
Daily	0.05%	0.08%	0.09%	0.08%	0.06%	0.02%	0.02%	0.02%	0.02%

The tracking error in the value of 3 Year Bond Futures to CGS 6.75 15/11/06 ranged between 2 and 7 basis points in 4th Qtr, 2003 across measurement intervals. These tracking errors represent 18 month lows, and confirm that 3 Year Bond Futures are an excellent mechanism for obtaining exposure to the return on 3 Year Bonds.

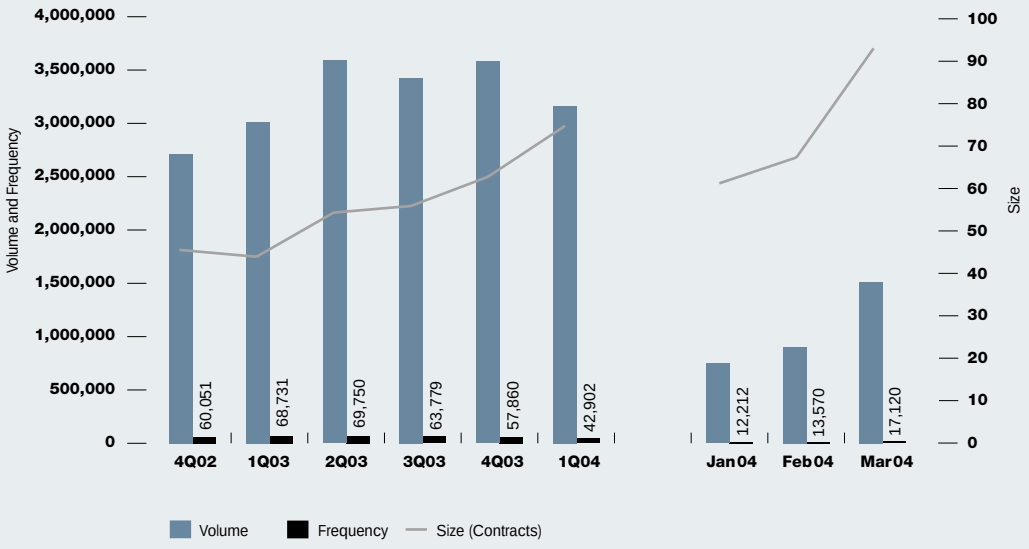
3 YEAR BOND FUTURES (continued)

3. Volatility

	4Q02	1Q03	2Q03	3Q03	4Q03	1Q04	Jan 04	Feb 04	Mar 04
Standard Deviation of Return									
Weekly	0.432%	0.353%	0.338%	0.310%	0.399%	0.447%	0.527%	0.239%	0.592%
Daily	0.186%	0.199%	0.201%	0.156%	0.160%	0.178%	0.211%	0.151%	0.174%
Average of (high-low)									
Monthly	0.47	0.47	0.39	0.36	0.44	0.38	0.36	0.28	0.49
Weekly	0.22	0.22	0.21	0.19	0.17	0.16	0.16	0.14	0.17
Daily	0.06	0.07	0.06	0.06	0.05	0.05	0.05	0.05	0.05

The daily price volatility has generally declined over the past 18 months, although price volatility for 1st Qtr 2004 is similar to the previous quarter. For example, the daily price range for 1st Qtr, 2004 averaged 5 basis points (or $139) per contract. This daily price range is approximately 20% of the initial margin for the contract, suggesting that there are significant profit-making opportunities for traders with a short-term (daily) trading horizon.

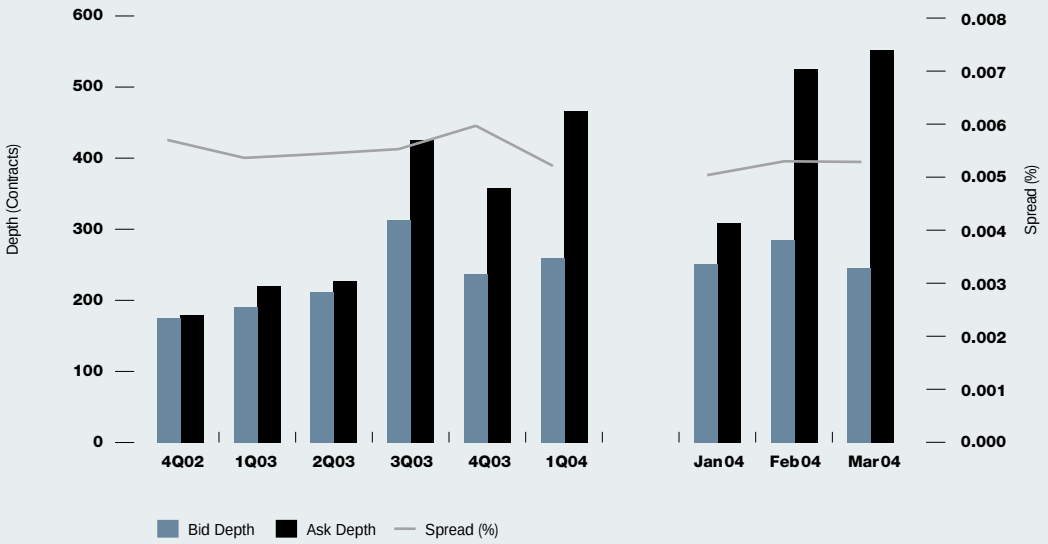
4. Trading Activity



While trading volume in the 1st Qtr, 2004 has declined QoQ, it is steady YoY. Consistent with transaction cost indicators, suggesting the liquidity of the contract is improving, the average trade size has continued to grow strongly. At over 70 contracts per transaction in 1st Qtr, 2004, the average trade size is at an 18 month high.

10 YEAR BOND FUTURES

1. Transaction Cost Indicators



Transaction cost indicators show a dramatic improvement in the cost of trading in 1st Qtr, 2004. The bid-ask spread over the quarter averaged approximately one-half of one basis point – the minimum tick. The bid-ask spread is at an 18 month low. Furthermore, market depth increased QoQ and YoY, and continues to exhibit an upward trend. All in all, this suggests that the liquidity and cost of trading 10 Year Bond Futures continues to improve.

2. Tracking Error

	4Q02	1Q03	2Q03	3Q03	4Q03	1Q04	Jan 04	Feb 04	Mar 04
Mean of ($R_{SPI} - R_{cash}$)									
Weekly	0.07%	0.09%	0.09%	0.13%	0.13%	0.08%	0.07%	0.07%	0.08%
Daily	0.05%	0.04%	0.05%	0.05%	0.06%	0.02%	0.02%	0.02%	0.02%
Standard Deviation of ($R_{SPI} - R_{cash}$)									
Weekly	0.04%	0.07%	0.09%	0.13%	0.15%	0.04%	0.04%	0.05%	0.04%
Daily	0.08%	0.06%	0.06%	0.07%	0.08%	0.02%	0.02%	0.02%	0.02%

The change in tracking error of 10 Year Bond Futures against CGS 6.50 15/05/13 has fallen significantly from 4th Qtr 2003 to 1st Qtr, 2004. At between 2 and 8 points, all measures of tracking error are at 18 month lows. These outcomes suggest that the 10 Year Bond Futures contract is a very efficient and improving tool for obtaining exposure to changes in long-term interest rates.

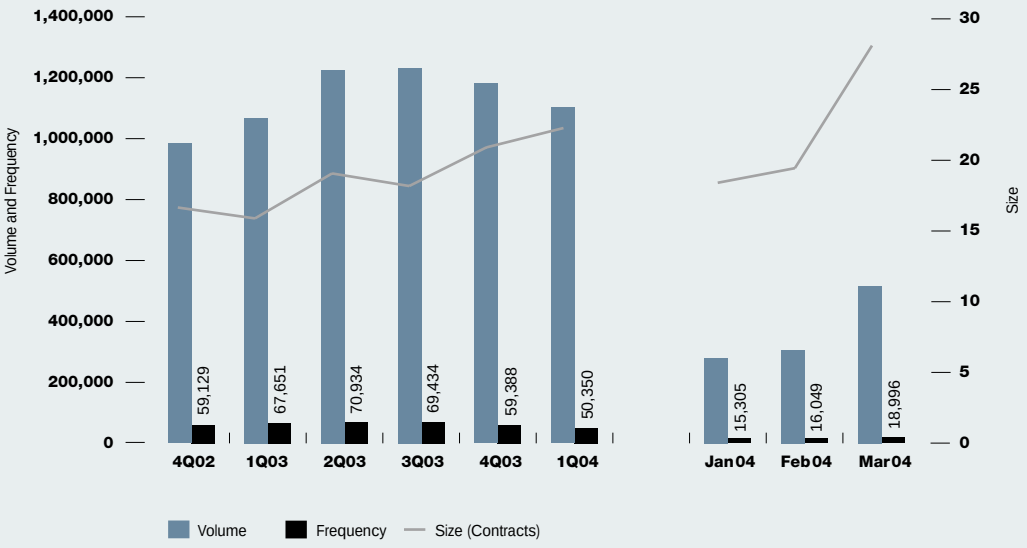
10 YEAR BOND FUTURES (continued)

3. Volatility

	4Q02	1Q03	2Q03	3Q03	4Q03	1Q04	Jan 04	Feb 04	Mar 04
Standard Deviation of Return									
Weekly	1.399%	0.921%	0.919%	0.979%	0.984%	1.245%	1.562%	0.678%	1.487%
Daily	0.580%	0.585%	0.554%	0.526%	0.497%	0.530%	0.681%	0.441%	0.469%
Average of (high-low)									
Monthly	0.59	0.45	0.48	0.46	0.42	0.37	0.36	0.35	0.41
Weekly	0.25	0.24	0.22	0.20	0.17	0.15	0.14	0.15	0.16
Daily	0.07	0.07	0.06	0.05	0.05	0.05	0.05	0.05	0.05

1st Qtr, 2004 has yielded volatility similar to the previous Qtr. For example, the daily price range for 1st Qtr, 2004 averaged 5 basis points (roughly $400) per contract. This daily price range is approximately 54% of the initial margin for the contract which, combined with low transaction costs, suggest that there are good opportunities for traders with a short term (intraday) trading horizon.

4. Trading Activity



Trading Activity in the nearest to delivery 10 Year Bond Futures contract fell slightly in 1st Qtr, 2004 and is roughly at the same level as 1st Qtr, 2003. Despite this, the improvement in the liquidity of the contract reflected in the transaction cost indicators are also reflected in the strong increase in the average size of transactions executed in the contract. At 22.3 contracts per trade, the average trade size in the nearest to delivery 10 Year Bond Futures contract for 1st Qtr, 2004 is at an 18 month high.