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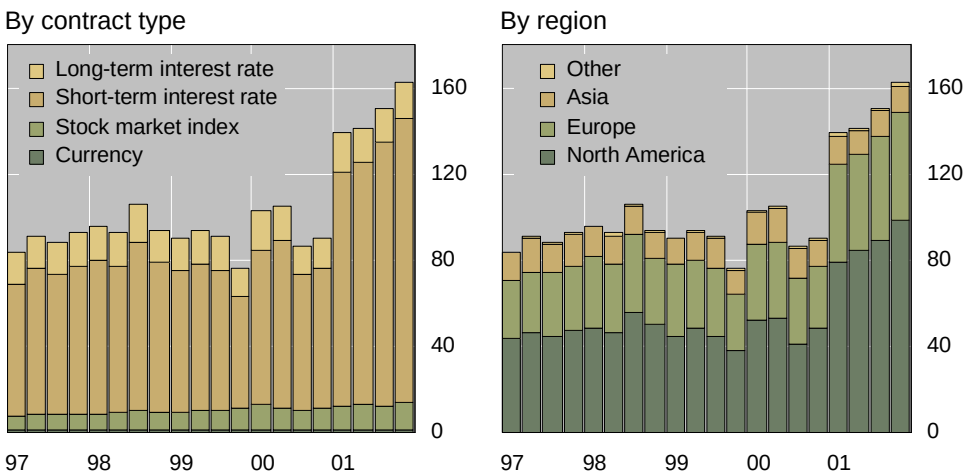
4. Derivatives markets

For the fourth time in a row, aggregate turnover of exchange-traded derivatives contracts monitored by the BIS reached a new record in the fourth quarter of 2001. The notional value of transactions rose by 8% to $163 trillion (Graph 4.1). Continued uncertainty concerning the extent of further monetary easing in the major industrialised countries and an abrupt reversal in the downward movement of government bond yields in the middle of the quarter were accompanied by an upsurge in the trading of fixed income contracts. Trading in money market contracts, which had been exceptionally buoyant since the beginning of the year against a background of monetary policy easing and changes in risk management practices, continued to be particularly robust. At the same time, transactions in stock index contracts also increased.

Activity for 2001 as a whole shows a spectacular increase in turnover in exchange-traded markets, with the value of transactions rising by 54% to $594 trillion. Business in money market contracts drove the upswing, with growth of 71%.[1]

Turnover of exchange-traded futures and options

Quarterly data, in trillions of US dollars



Sources: FOW TRADEdata; Futures Industry Association; BIS calculations. Graph 4.1

[1] The box on page 37 discusses the major trends in exchange-traded markets during 2001.

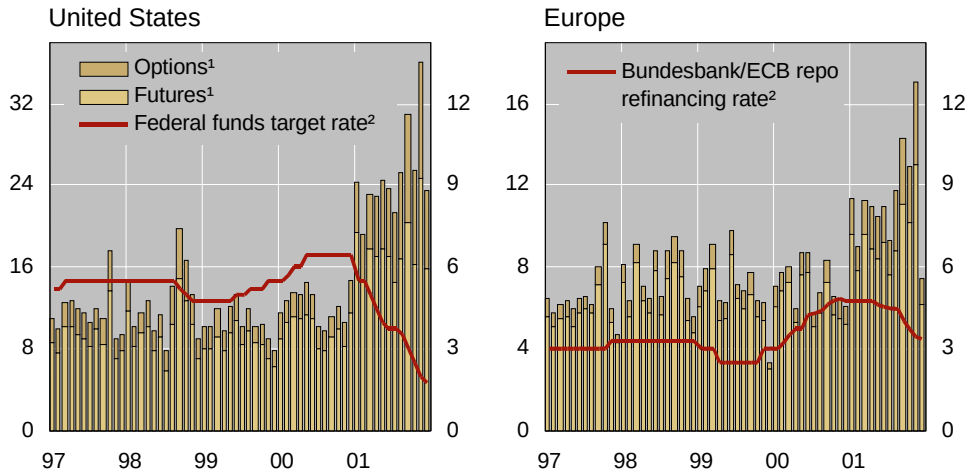
Expectations of turning point in interest rates fuel trading in money market futures

Activity in exchange-traded interest rate contracts expanded at a steady pace in the fourth quarter of 2001, with total turnover rising by 8% to $149.2 trillion. In contrast to the previous reporting period, when business in short-term instruments had increased by more than that in longer-term ones, there was no major difference in the outturn for short- and longer-term contracts.

Expectations shift in November

Trading in money market futures increased by 8% to $95.7 trillion in the fourth quarter (Graph 4.2). Expectations of further reductions in policy rates in the early part of the fourth quarter changed considerably in November on the back of a sustained recovery in global equity markets and perceptions that the US economy was reaching a trough. This led market participants to believe that monetary policy easing would moderate and perhaps even turn to tightening in 2002.[2] Such increasingly strong anticipations of a turnaround in the interest rate cycle, in the face of further reductions in official rates, appear to have been a major element in the record volume of activity seen in US money market futures in the fourth quarter. Although the easing of policy rates was somewhat less pronounced in Europe, the extent of uncertainty in world financial markets seems to have had an impact there as well, leading to record activity in European money market futures.

Short-term interest rate contracts and central bank target rates



¹ Notional amounts; monthly turnover in trillions of US dollars (lhs). ² In percentages (rhs).

Sources: FOW TRADEdata; Futures Industry Association; BIS calculations. Graph 4.2

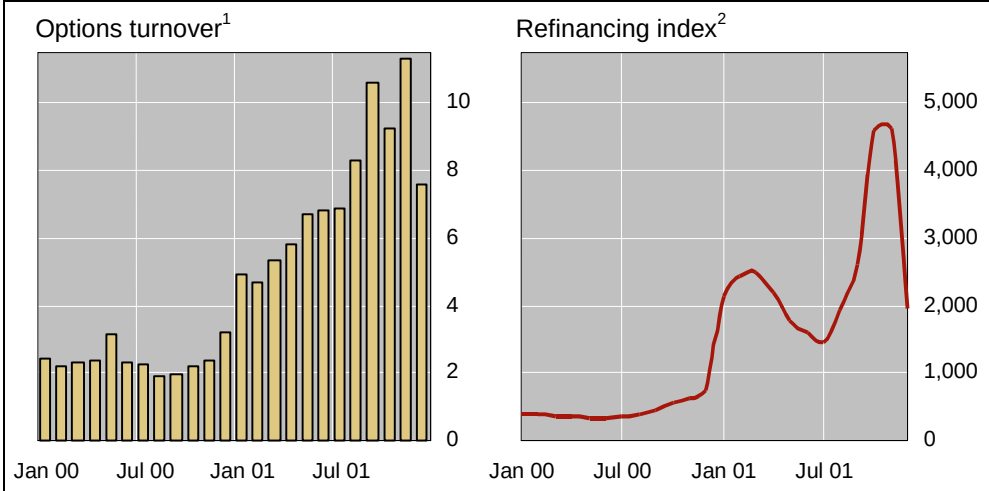
[2] This was reflected in the pattern of activity in eurodollar contracts, with front month contracts reaching record prices and deferred ones losing ground even as US policy rates were reduced.

Swings in US mortgage refinancing support activity in money market options

US mortgage market drives short-term interest rate options market

Meanwhile, the growth of turnover in money market options, a market segment that has also been particularly active since the beginning of 2001, moderated somewhat in the fourth quarter, with transactions expanding by 8% to $36.2 trillion. Once again, activity in short-term interest rate options appears to have been largely driven by developments in the US mortgage market (see the December 2001 issue of the *BIS Quarterly Review* for a more detailed discussion). Interest rate options and swaps are actively used by participants in the wholesale mortgage market to protect themselves against prepayment and extension risk.[3] As is illustrated by Graph 4.3, US mortgage refinancing applications dropped sharply following a record high in early November. This led to a major lengthening in the duration of MBSs with, in turn, an abrupt reversal of outstanding hedges and the establishment of new ones protecting against extension risk.[4]

Options turnover on US short-term interest rates and US mortgage refinancing index



[1] In trillions of US dollars. [2] Four-week moving average, 16 March 1990 = 100.

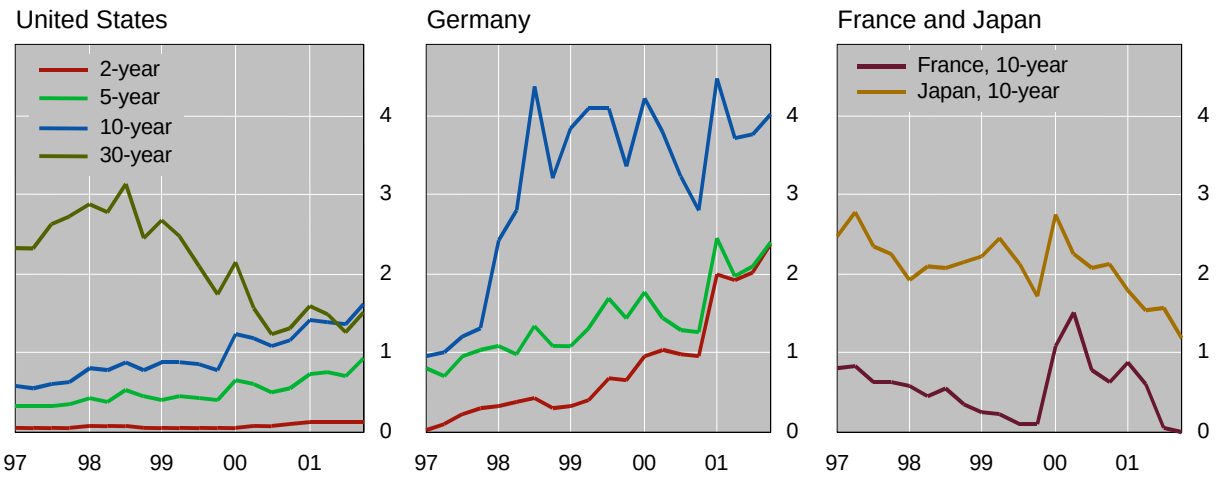
Sources: Financial Oxygen; FOW TRADEdata; Futures Industry Association; Mortgage Bankers Association; BIS calculations. Graph 4.3

[3] Investors in mortgage-backed securities (MBSs) face significant prepayment (or convexity) risks since the holders of the underlying mortgages enjoy certain prepayment privileges such as the ability to refinance the mortgages on more favourable terms when long-term interest rates decline. Such early repayments in turn lead issuers to call MBSs as the underlying pool of mortgages shrinks. The opposite is true when long-term interest rates rise, as reduced prepayments lead to an extension of duration.

[4] The aim of such new hedges was to shorten the duration of MBS portfolios. Some of these hedges involved the paying of fixed rates under interest rate swaps or the purchasing of payer (or put) swaptions.

Turnover in government bond contracts

Quarterly futures contract turnover, in trillions of US dollars



Sources: FOW TRADEdata; Futures Industry Association; BIS calculations. Graph 4.4

Trading in government bond contracts returns to expansion

There was a resurgence of trading in government bond contracts in the fourth quarter of 2001, following two consecutive quarterly declines. Aggregate turnover rose by 11% to $17.7 trillion. Of this total, futures rose by 9% to $15.2 trillion, while options jumped by 24% to $2.5 trillion.

Global bond market reversal leads to upswing in bond futures

The recovery of trading in government bond instruments was due to a number of general and idiosyncratic factors that pushed market volatility to very high levels. The broadest influence appears to have been the reversal in global bond markets in November. The US Treasury market, in particular, was buffeted by signs that the US economy was stabilising and by an unwinding of safe haven purchases made in the wake of the 11 September attacks. Moreover, concerns that the attacks would lead to a further increase in US corporate defaults, and the failure of Enron, triggered bouts of volatility in the corporate bond market, with the resulting movement of funds into Treasuries probably amplifying their volatility. These broad developments seem to have accounted for much of the 26% increase in the turnover of US bond contracts.

US Treasury announcement causes surprise

The various segments of the US Treasury market were also subjected to specific influences. The US Treasury's announcement on 31 October that it would halt sales of 30-year Treasury bonds appears to have taken market participants by surprise, sparking one of the strongest rallies ever in the Treasury market.[5] With a large number of traders reportedly holding yield curve steepening positions in US Treasuries,[6] the announcement triggered a round of

[5] In February 2001, the Treasury's Borrowing Advisory Committee had recommended that sales of Treasury bonds be ended, but the weakness of economic activity seems to have led market participants to discount that announcement.

[6] Involving long positions in short-term Treasury notes in anticipation of interest rate cuts and short ones in longer-term Treasuries on the assumption of additional supply.

short covering that played a major part in the steep price gains recorded at the long end. Activity in the US Treasury bond futures market, which had seen a gradual decline during the first three quarters of the year, sprang back to life (by 21%). At the same time, business in the 10-year contract, now the undisputed US benchmark, and the five-year futures also grew strongly. Activity in the two-year Treasury note contract, however, recorded a slight decline. Market sources have suggested that liquidity in the two-year area, a key maturity for position-taking on Federal Reserve actions, may have shifted to the cash market.

US Treasury bond futures spring back to life

Evidence of economic weakness in Europe also seems to have boosted turnover in European bond contracts, with business in German government bond contracts accelerating in the fourth quarter (by 11%). Although transactions in the 10-year bund contract rose appreciably (7%), expansion was once again more pronounced in the two-year and five-year maturities (Euro Schatz and Euro Bobl). This is thought to reflect the growing role of German government securities as European benchmarks.[7]

European economic weakness boosts bond futures

By contrast, activity in Japanese government bond (JGB) futures extended the downward trend observed since the beginning of 2000, with a 25% contraction in turnover. The downgrading of JGBs by a rating agency at the end of November and the weakness of overall economic conditions in Japan led market participants to sell some longer-term Japanese assets, including JGBs. This may in turn have reduced the need to use the futures market to hedge portfolios.

Lastly, trading in LIFFE's euro-denominated Swapnote contracts expanded at a much slower pace than in the previous quarter (2% versus 27%). Although activity in such contracts remains rather marginal, accounting for less than 2% of the value of turnover in German government bond futures, other exchanges believe that futures on swap rates hold promising prospects, as illustrated by the CBOT's introduction of a similar contract at the end of October (discussed on pages 38–40).

Slower growth in Swapnotes trading

Equity index business expands against a background of declining equity market volatility

Although volatility in global equity markets declined after reaching a peak in October, overall activity in equity index contracts expanded by 10% to $12.8 trillion. Business on Asian and North American exchanges rose by 40% and 7% respectively, while that on European exchanges dropped by 5%. The strong increase recorded in Asia resulted largely from the rapid development of option trading in Korea. This also explains why the volume of activity in Asian equity products has exceeded European business since the third quarter of 2001.

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[7] Meanwhile, trading in the Euro Notional contract on Euronext Paris (Matif) dried up, while the exchange's five-year bond contract, introduced in May 2001, did not meet expectations and was abandoned.

Exchange-traded activity soars in 2001

For the year 2001 as a whole, the aggregate value of turnover in financial products monitored by the BIS rose by 55% to $594 trillion. This was by far the largest yearly increase in activity since 1993 (the year the BIS began to compute value-based statistics for financial contracts). This upsurge reflected the nervous state of financial markets during much of the year. Forceful US monetary easing aimed at countering an economic slowdown combined with the turbulence caused by the 11 September attacks made 2001 one of the most volatile years since the 1950s.

Business in interest rate contracts grew the most rapidly (by 60% to $543 trillion), with money market instruments driving the expansion (rising by 71% to $475 trillion). Money market business was fuelled by monetary easing as well as by broad changes in risk management practices (as discussed in previous issues of the *BIS Quarterly Review*). By comparison, business in government bonds increased at a more moderate pace (by 11% to $68 trillion).

Equity index business expanded at a rate comparable to that of bond market instruments (by 13% to $48 trillion).[①] The value of trading in such instruments has grown at a steady pace in recent years, supported by the introduction of new sectoral and retail-targeted products in established marketplaces as well as rapid growth of recently established exchanges in Asia. Meanwhile, activity in currency contracts increased modestly (by 8% to $2.8 trillion). With currency risk management remaining the preserve of the over-the-counter market, such business accounts for only a marginal share of exchange-traded activity.

Looking at aggregate activity on the major exchanges, one of the most notable developments was the upsurge of activity on the Chicago Mercantile Exchange (CME).[②] With the number of contracts traded rising by 78% to 412 million, the CME replaced the Chicago Board Options Exchange (CBOE) as second most active marketplace in the world.[③] The CME greatly benefited from the upswing in its flagship eurodollar contract, which became the most actively traded in the world (ahead of the bund). The CBOE, by contrast, witnessed a 6% decline in activity. Although the exchange benefited from a higher turnover of its equity index contracts, it witnessed a contraction of its single equity contracts. The CBOE had to face strong competition from other US exchanges and, in particular, from the recently established International Stock Exchange, the first fully electronic US equity option exchange. Meanwhile, Eurex maintained its position as the most active marketplace in the world, with business rising by 49% to 665 million contracts. Although the exchange capitalised on the continued popularity of its government bond contracts, expansion was largely driven by its equity products.

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① It should be noted that data on the turnover of equity index contracts are likely to understate the overall expansion of equity-related business because the BIS value data do not capture all market activity (eg the turnover of options on single equities is not included). ② Comparing activity between exchanges is not straightforward since business can be measured in terms of both the number of contracts traded and the dollar value of transactions. Most exchanges tend to report market activity in number of contracts traded. Although such a measure is imprecise it is the simplest way of establishing the relative levels of activity on exchanges. It permits a cross-market comparison with contracts for which no value calculations are readily available (principally options on single equities and commodity contracts). ③ Based on the number of contracts traded, the Korea Stock Exchange (KSE) would be the largest derivatives exchange in the world. However, given that the size of contracts traded on that exchange is considerably smaller than that of those traded on the major world exchanges, the KSE was not considered in our global ranking of exchanges.

Enron has limited impact on exchange-traded activity

Shift of trading away from Enron's platform

The proliferation of increasingly negative news reports concerning the financial situation of US energy trading firm Enron in November last year, followed by the company's bankruptcy filing in December, reportedly led to a shift of trading activity away from the company's trading platform to other trading venues, including other over-the-counter (OTC) energy trading platforms and regulated

exchanges. However, the 10% increase in energy-related business in the fourth quarter was not inordinately large by historical standards. In the absence of comparable data on OTC market activity, it is not possible to ascertain whether OTC trading platforms attracted a larger share of business than exchange-traded markets.

CBOT launches swap futures contracts

On 26 October 2001, the Chicago Board of Trade (CBOT) launched an interest rate swap futures contract.[8] The new contract, which is traded both on open outcry and on the exchange's electronic trading platform, is based on the International Swaps and Derivatives Association's benchmark rate for 10-year US dollar interest rate swaps (Table 4.1). It offers financial market participants a new vehicle for the hedging of interest rate exposure referenced to long-dated Libor.

Futures contract could benefit from growing importance of swaps ...

A number of market participants have recently noted that the growing role played by interest rate swaps in US financial markets could provide fertile ground for the development of futures on swap rates.[9] The global crisis that followed the default by Russia in August 1998 highlighted the risks inherent in the use of government bonds and related exchange-traded derivatives contracts to hedge positions in non-government securities, leading market participants to seek alternative instruments such as interest rate swaps. A reduction in the liquidity of US government debt following net debt repayment by the US Treasury between 1998 and 2001 reinforced this shift to swaps. The US government is projected to return to a negative fiscal balance in 2002, but the share of US Treasury instruments in the universe of US fixed income instruments is likely to decline further as non-government borrowers continue to expand their issuing activity. This means that financial market participants will continue to seek trading and pricing instruments that are more closely linked to "spread products".

... and from some of their limitations

Exchanges are trying to capitalise on the fact that the OTC swap market continues to face some of the limitations associated with decentralised and customised marketplaces. In such markets, participants tend to maintain a large number of bilateral counterparty relationships since each new transaction involves the writing of an additional contract with a dealer. Moreover, time and administrative costs tend to complicate the transfer (or "assignment" in market terminology) of contracts from one counterparty to another.[10] Finally, the

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[8] This section draws on information provided by the CBOT at www.cbot.com.

[9] The potential advantages of the new contract are discussed in detail in Gerald Lucas and Joseph Schatz, "CBOT 10-year swap futures", *Fixed Income Strategy*, Merrill Lynch, 24 October 2001; Laurie Goodman, "The new swap futures contract", *Mortgage Strategist*, UBS Warburg, 23 October 2001; and David A Boberski, "Swap futures launch at CBOT", *Bond Market Roundup*, SalomonSmithBarney, 5 October 2001.

[10] For example, although swaps can be transferred to any mutually acceptable counterparty, both original counterparties must first agree on a new one before the transfer can proceed, which involves some inconvenience.

offsetting of an existing position involves the pricing of a new swap at off-market rates, which can lead dealers to charge a slightly wider bid-offer spread.

Centralised trading would provide benefits

Active trading through a centralised futures exchange would provide several benefits. First, any early liquidation of contracts would be made administratively simpler since it would only involve an offsetting of transactions on the exchange (the contracts being identical). Second, the standardisation of exchange-traded contracts would enable traders to conduct transactions more rapidly and at a lower cost. Third, growing concerns about counterparty credit risks may encourage some market participants to seek exposure to a triple-A rated clearing house rather than to a lower-rated dealing bank. Fourth, the ability to trade swaps on an exchange should improve market access for participants who have been hampered for credit-related reasons. Non-rated or non-investment grade market participants often have to pay swap dealers a slight yield premium (in the form of a wider bid-ask spread) that depends on their credit quality. Trading on an exchange, where counterparty risk is minimised through strict margin requirements, would enable such participants to avoid this premium and thus conduct transactions at a single rate (that of ISDA, which is a mid-market quote on dealer-to-dealer transactions). Although successful entry by lower-standing counterparties could have implications for

Main features of the CBOT's 10-year interest rate swap futures contract

Trading unit

The trading unit is based on the notional price of the fixed rate side of a 10-year interest rate swap that has notional principal of $100,000, and that exchanges semiannual interest payments at a fixed rate of 6% per annum for floating interest rate payments based on three-month Libor.

Price quote

Prices are quoted in points ($1,000) and thirty-seconds of a point (1/32 or $31.25), based on the notional principal of $100,000.

Contract months

The first three consecutive contracts in the March-June-September-December quarterly cycle.

Delivery method

By cash settlement. The final settlement value will be determined as $100,000 * [6/*r* + (1 – 6/*r*)*(1 + 0.01**r*/2) – 20] where *r* represents the ISDA benchmark rate for a 10-year US dollar interest rate swap on the last day of trading, expressed in percentage terms. For example, if the ISDA benchmark rate were 5¼%, then *r* would be 5.25. The contract expiration price is the final settlement value rounded to the nearest quarter of one thirty-second of one point.

Settlement

The notional price of the trading unit on the last day of trading is based on the ISDA benchmark rate for a 10-year US dollar interest rate swap on the last day of trading, as published on the following business day by the Federal Reserve Board in its daily update to the H.15 statistical release.

Table 4.1

the profit margins of existing OTC market participants, it could provide additional depth and liquidity to the broader swap market.

CBOT contract should be useful in its own right ...

Aside from the benefits associated with trading on a centralised marketplace, the CBOT swap contract should be useful in its own right. First, the contract should potentially provide an effective hedge for non-government liabilities, minimising basis risk when used to hedge agency, corporate and mortgage-backed securities.[11] Second, swap futures should create opportunities to structure spread trades between swaps and other CBOT contracts with similar maturities. The design of the swap contract is very similar to that of a standard agency or government bond future, with the same notional size and coupon. Third, the swap contract should also supplement existing trading vehicles. The contract shares some of the features of eurodollar futures traded on the CME, with similar expiration dates and cash settlement. Eurodollar futures can be used to replicate the fixed or floating branches of swap contracts but only out to five years, after which liquidity drops sharply. The new swap contract should help fill a gap in market liquidity, with positive spin-offs for the broader swap market.[12]

... but much depends on how liquid it will become

Of course, much depends on whether the swap futures contract attracts sufficient liquidity. The CBOT has attempted to diversify out of US Treasury products in recent years by developing a number of potentially promising contracts, such as agency and mortgage futures. However, due to low liquidity, their usefulness as hedging and trading instruments has remained limited.

[11] The contract will not be affected by the idiosyncratic distortions affecting the US Treasury market such as supply and demand imbalances and specialness in the repurchase market.

[12] One of the particularly attractive features of the swap contract is that it exhibits the same convexity as cash bonds and interest rate swaps. This is in contrast to eurodollar futures, whose pricing structure imposes a linear duration (since the price of contracts is derived as 100 – rate = price).