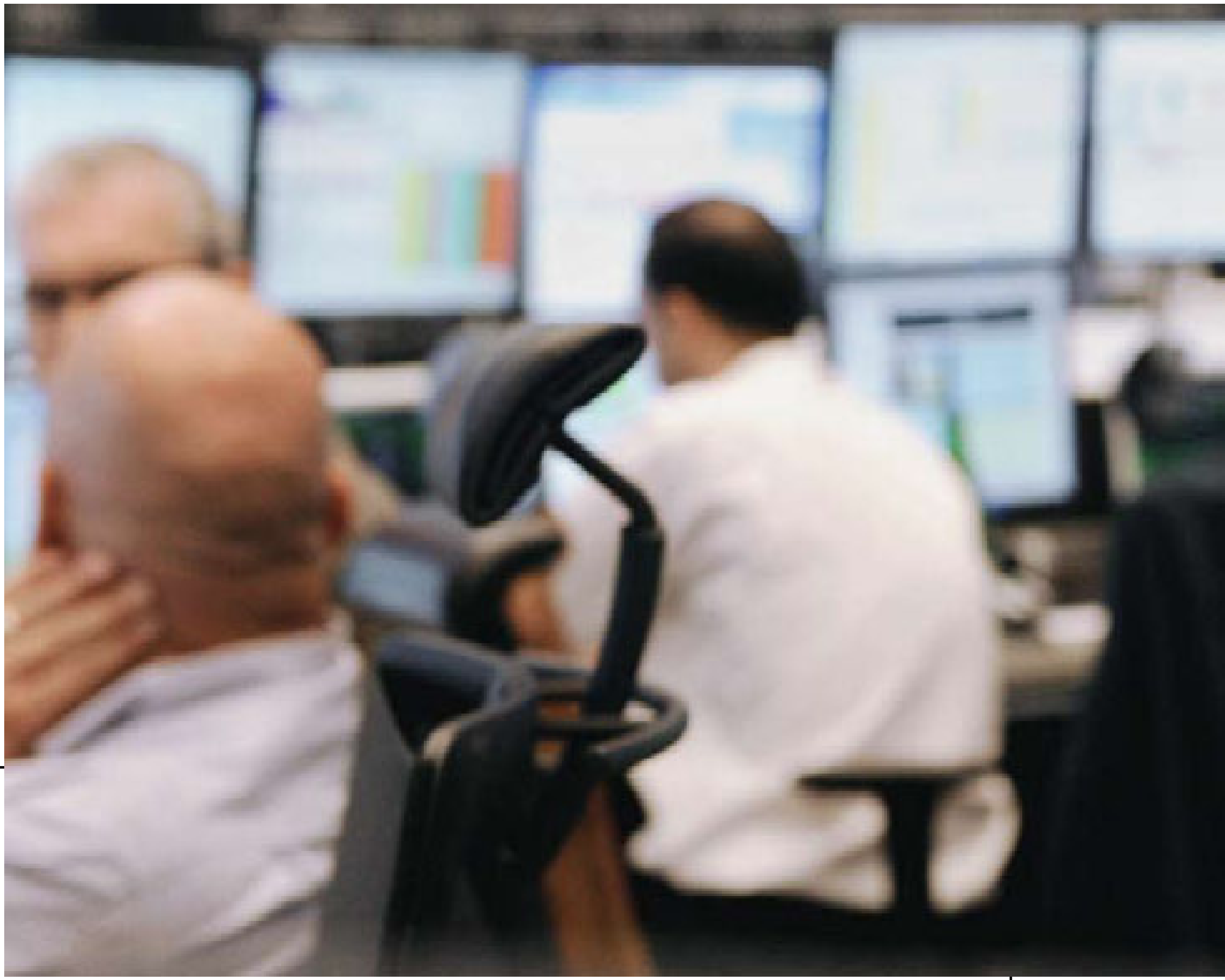


3 ELECTRICITY FINANCIAL MARKETS

Thomas Lohnes (Getty Images)

Spot price volatility in the National Electricity Market can cause significant risk to physical market participants. While generators face a risk of low prices having an impact on earnings, retailers face a complementary risk that prices may rise to levels they cannot pass on to their customers. Market participants commonly manage their exposure to volatility by entering financial contracts that lock in firm prices for the electricity they intend to produce or buy in the future.

3 ELECTRICITY FINANCIAL MARKETS

This chapter considers:

- the structure of electricity financial markets in Australia, including over-the-counter markets and the exchange traded market on the Sydney Futures Exchange
- financial market instruments traded in Australia
- liquidity indicators for Australia's electricity financial markets, including trading volumes, open interest, changes in the demand for particular instruments, changes in market structure, and vertical integration in the underlying electricity wholesale market
- price outcomes on the Sydney Futures Exchange
- other mechanisms to manage price risk in the wholesale electricity market.

While the Australian Energy Regulator (AER) does not regulate the electricity derivatives markets, it monitors the markets because they have significant links with wholesale and retail activity. Levels of contracting and forward prices in the financial markets can, for example, affect generator bidding in the National Electricity Market (NEM). Similarly, financial markets can influence retail competition by providing a means for new entrants to manage price risk. More generally, the markets create price signals for energy infrastructure investors and provide a means to secure the future earnings streams needed to underpin investment.

3.1 Financial market structure

Financial markets offer contractual instruments (derivatives) to manage forward price risk in wholesale electricity markets.[1] While the derivatives provide a means of locking in future prices, they do not give rise to the physical delivery of electricity.

The participants in electricity derivatives markets include generators, retailers, financial intermediaries and speculators such as hedge funds. Brokers facilitate many transactions between contracting participants.

In Australia, two distinct electricity financial markets support the wholesale electricity market:

> over-the-counter (OTC) markets, comprising direct transactions between counterparties, often with the assistance of a broker

> the exchange traded market on the Sydney Futures Exchange (SFE).[2]

3.1.1 Over-the-counter markets

The OTC markets allow wholesale electricity market participants to enter into confidential contracts to manage risk. Many OTC contracts are bilateral arrangements between generators and retailers, which face opposing risks in the wholesale electricity market. Other OTC contracts are arranged with the assistance of brokers that post bid (buy) and ask (sell) prices on behalf of their clients. In 2008–09 around 62 per cent of OTC contracts were arranged through a broker.[3] Financial intermediaries and speculators add market depth and liquidity by quoting bid and ask prices, taking trading positions and taking on market risk to facilitate transactions.

Most OTC transactions are documented under the International Swaps and Derivatives Association Master Agreement, which provides a template of standard terms and conditions, including terms of credit, default provisions and settlement arrangements. While the template creates considerable standardisation in OTC contracts, market participants usually modify contract terms to suit their needs. This means OTC products can provide flexible solutions through a variety of structures.

The *Financial Services Reform Act 2001* (Cwlth) includes disclosure provisions that relate to OTC markets. In general, however, the bilateral nature of OTC markets tends to make volume and price activity less transparent than in the exchange traded market.

3.1.2 Exchange traded futures

Derivative products such as electricity futures and options are traded on registered exchanges. In Australia, electricity futures products developed by d-cyphaTrade are traded on the SFE. Participants (licensed brokers) buy and sell contracts on behalf of clients that include generators, retailers, speculators such as hedge funds, and banks and other financial intermediaries.

Normal trades on the SFE are made by matching buy and sell offers for contracts through the exchange. Prices struck through normal trades are used to determine end-of-day contract settlement prices.

Block trades are negotiated bilaterally—either via brokers or directly between counterparties—before being registered as a centrally cleared contract position on the SFE. This trading mechanism provides market participants with the flexibility to negotiate deals bilaterally yet receive the risk mitigation benefits of contracting with the SFE Clearing Corporation. Similarly, *exchange for physical* contracts enable participants to eliminate credit default risk by converting OTC contracts into exchange traded contracts. Participants are limited to combinations of products specified on the SFE. Block trades and exchange for physical contract prices are not used to determine end-of-day contract settlement prices.

1 Spot prices in the wholesale market can vary between –$1000 per megawatt hour (MWh) (the price floor) and $10 000 per MWh (the price cap). To manage risk resulting from volatility in the spot price, retailers can hedge their portfolios by purchasing financial derivatives that lock in firm prices for the volume of energy they expect to purchase in the future. This eliminates exposure to future price volatility for the quantity hedged and provides greater certainty on profits. Similarly, a generator can hedge against low spot prices.

2 In 2006 the Sydney Futures Exchange merged with the Australian Stock Exchange. The merged business operates as the Australian Securities Exchange.

3 AFMA, *2008 Australian financial markets report*, Sydney, 2008 and supporting 'Full report data' spreadsheet.

Figure 3.1 shows that over half of trades processed through the SFE are block trades. Only a small percentage of trades are exchange for physical contracts.

Exchange trading on the SFE differs from OTC trading in a number of ways:

> Exchange traded derivatives are highly standardised in terms of contract size, minimum allowable price fluctuations, maturity dates and load profiles. The product range in OTC markets tends to be more diverse and includes 'sculpted' products.

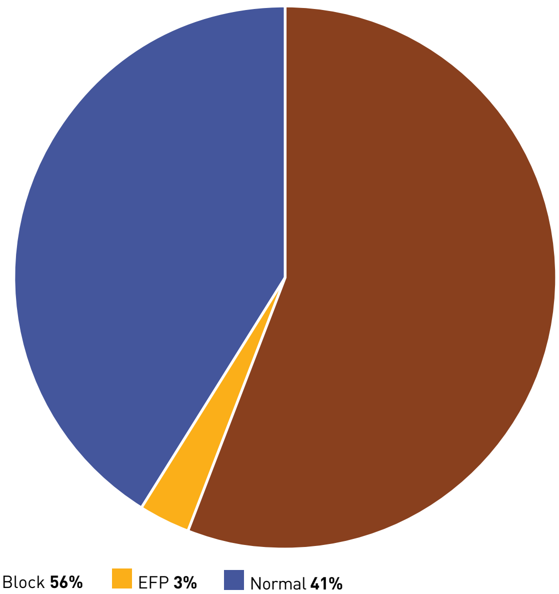
> Exchange trades are multilateral and publicly reported, giving rise to greater market transparency and price discovery than in the OTC market.

> Unlike OTC transactions, exchange traded derivatives are settled through a centralised clearing house, which is the central counterparty to transactions and applies daily mark-to-market cash margining to manage credit default risk.[4] Exchange clearing houses, such as the SFE Clearing Corporation, are regulated and are subject to prudential requirements to mitigate credit default risks. This offers an alternative to OTC trading, where trading parties rely on the credit worthiness of electricity market counterparties. More generally, liquidity issues can arise in OTC markets if trading parties reach or breach their credit risk limits with other OTC counterparties (for example, breaches due to revaluations of existing bilateral hedge obligations or credit downgrades of counterparties).

3.1.3 Regulatory framework

Electricity financial markets are subject to a regulatory framework that includes the *Corporations Act 2001* (Cwlth) and the *Financial Services Reform Act 2001* (Cwlth). The Australian Securities and Investments Commission is the principal regulatory agency. Amendments to the Corporations Act in 2002 extended insider trading legislation and the disclosure principles expected of securities and equity related futures to electricity derivative contracts.

Figure 3.1
Composition of trading in electricity derivatives —Sydney Futures Exchange



EFP, exchange for physical.

Source: d-cyphaTrade.

Market participants must also comply with standards issued by the Australian Accounting Standards Board (AASB). In particular, AASB 139 requires companies' hedging arrangements to pass an effectiveness test to qualify for hedge accounting. The standards also outline financial reporting obligations such as mark-to-market valuation of derivative portfolios, and they require financial derivative revaluations to be benchmarked against observable market prices and adjusted for embedded credit default risk.

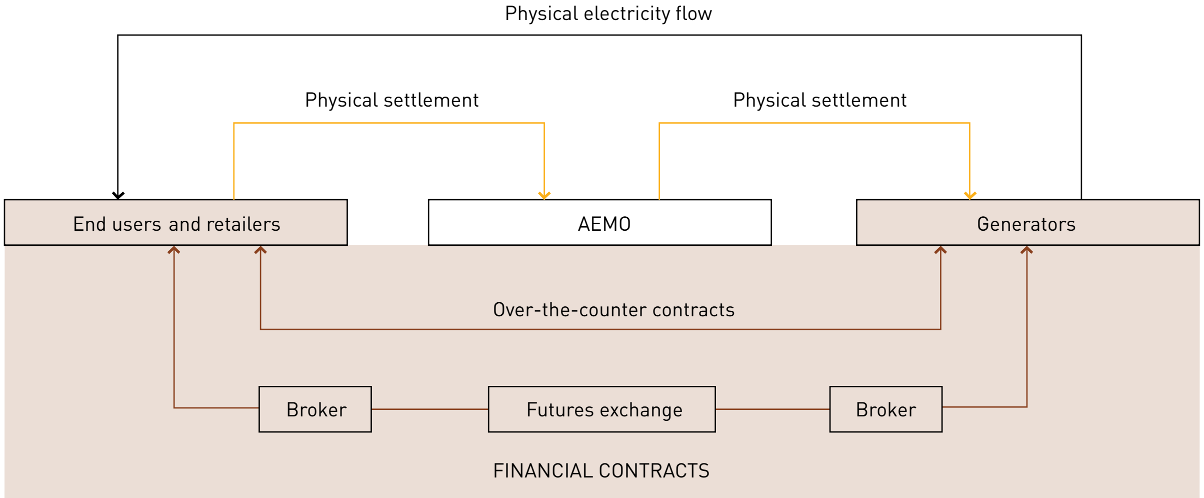
Further regulatory overlays in electricity derivative markets include the following:

> The Corporations Act requires OTC market participants to have an Australian Financial Services licence or exemption.

> Exchange based transactions are subject to the operating rules of the SFE.

4 Mark-to-market refers to the valuation technique whereby unrealised profit or loss from a derivative position is determined (and reported in financial statements) by reference to prevailing market prices.

Figure 3.2
Relationship between the National Electricity Market and financial markets



AEMO, Australian Energy Market Operator.

Source: Energy Reform Implementation Group.

3.1.4 Relationship with the National Electricity Market

Figure 3.2 illustrates the relationship between the financial markets and the physical trading of electricity in the NEM. Trading and settlement in the NEM occur independently of financial market activity, although a generator's exposure in the financial market can affect its bidding behaviour in the NEM. Similarly, a retailer's exposure to the financial market may affect the pricing and availability of supply contracts that it offers to customers.

The settlement process in the NEM, combined with hedging contracts, gives rise to circular cash flows or contracts for difference payments. The NEM settlement arrangements also allow for re-allocations, whereby an off-market financial commitment (such as a hedge contract between participants) is netted off against settlements in the physical market. This mechanism has not been widely used.

The Australian Energy Market Commission (AEMC) is reviewing the potential for further integrating the wholesale and financial electricity markets to minimise circular cash flows and reduce the prudential burden on market participants.[5] Options include:

- allowing a NEM participant to offset its prudential requirements using its futures contract margin payments
- using futures prices to determine a participant's prudential obligations, rather than relying on historical wholesale price outcomes.

3.2 Financial market instruments

The financial market instruments traded in the OTC and exchange traded markets are called derivatives because they derive their value from an underlying asset—in this case, electricity traded in the NEM. The derivatives give rise to cash flows from the differences between the contract price of the derivative and the spot price of electricity. The prices of these instruments reflect the expected spot price, plus premiums to cover credit default risk and market risk.

5 AEMC, *Review into the role of hedging contracts in the existing NEM prudential framework, framework and issues paper*, Sydney, March 2009.

Table 3.1 Common electricity derivatives in over-the-counter and Sydney Futures Exchange markets

INSTRUMENT	DESCRIPTION
Forward contracts	An agreement to exchange the NEM spot price in the future for an agreed fixed price. Forwards are called swaps in the OTC markets and futures on the SFE.
> Swaps (OTC market)	OTC swap settlements are typically paid or received weekly in arrears (after the spot price is known) based on the difference between the spot price and the previously agreed fixed price.
> Futures (SFE)	SFE electricity futures and options settlements are paid or received daily based on mark-to-market valuations. SFE futures are finally cash settled against the average spot price of the relevant quarter.
Options	A right—without obligation—to enter into a transaction at an agreed price in the future (exercisable option) or a right to receive cash flow differences between an agreed price and a floating price (cash settled option).
> Cap	A contract through which the buyer earns payments when the pool price exceeds an agreed price. Caps are typically purchased by retailers to place a ceiling on their effective pool purchase price in the future.
> Floor	A contract through which the buyer earns payments when the pool price is less than an agreed price. Floors are typically purchased by generators to ensure a minimum effective pool sale price in the future.
> Swaptions or futures options	An option to enter a swap or futures contract at an agreed price and time in the future.
> Asian options	An option through which the payoff is linked to the average value of an underlying benchmark (usually the NEM spot price) during a defined period.
> Profiled volume options for sculpted loads	A volumetric option that gives the holder the right to purchase a flexible volume in the future at a fixed price.

NEM, National Electricity Market; OTC, over-the-counter; SFE, Sydney Futures Exchange

Table 3.1 lists some of the derivative instruments available in the OTC and exchange traded markets. Common derivatives to hedge exposure to the NEM spot price are forwards (such as swaps and futures) and options (such as caps). Each provides the buyer and seller with a fixed price—and, therefore, a predictable future cash flow—on purchase/sale of the derivative or, in the case of an option, if the option is exercised. The following section describes some instruments in more detail.

3.2.1 Forward contracts

Forward contracts—called swaps in the OTC market and futures on the SFE—allow a party to buy or sell a given quantity of electricity at a fixed price over a specified time. Each contract relates to a nominated time of day in a particular region. On the SFE, contracts are quoted for quarterly base and peak contracts, for up to four years into the future.[6]

A retailer may, for example, enter an OTC contract to buy 10 megawatts (MW) of Victorian peak load in the fourth quarter of 2009 at $40 per megawatt hour (MWh). During that quarter, whenever the Victorian spot price for any interval from 7.00 am to 10.00 pm Monday to Friday settles above $40 per MWh, the seller (which might be a generator or financial intermediary) pays the difference to the retailer. Conversely, the retailer pays the difference to the seller when the price settles below $40 per MWh. In effect, the contract locks in a price of $40 per MWh for both parties.

A typical OTC swap may involve a retailer and generator contracting with one another—directly or through a broker—to exchange the NEM spot price for a fixed price, thereby reducing market risk for both parties. On the exchange traded market, the parties (generators, retailers, financial intermediaries and speculators) that buy and sell futures contracts through SFE brokers remain anonymous. The SFE Clearing Corporation is the central counterparty to SFE transactions. As noted, exchange trading is more transparent in terms of prices and trading volumes.

6 A peak contract relates to the hours from 7.00 am to 10.00 pm Monday to Friday, excluding public holidays. An off-peak contract relates to hours outside that period. A flat price contract covers both peak and off-peak periods.

While the SFE tends to offer a narrower range of instruments than offered by the OTC market,[7] up to 3000 futures and options products are listed on the SFE at any time.

3.2.2 Options

While a swap or futures contract gives price certainty, it locks the parties into defined contract prices with defined volumes, without an opt-out provision if the underlying market moves adversely to the agreed contract price. An option gives the holder the right—without obligation—to enter a contract at an agreed price, volume and term in the future. The buyer pays a premium to the option seller for this added flexibility.

An exercisable call (put) option gives the holder the right to buy (sell) a specified volume of electricity futures (or swaps) in the future at a predetermined strike price—either at any time up to the option's expiry (an 'American' option) or at expiry (a 'European' option). A retailer that buys a call option to protect against a rise in NEM forward contract prices, for example, can later abandon that option if forward prices do not rise as predicted. The retailer could then take advantage of the lower prevailing forward (or NEM spot) price.

Commonly traded options in the electricity market are caps, floors and collars.[8] A cap allows the buyer—for example, a retailer with a natural short exposure to spot prices—to set an upper limit on the price that they will pay for electricity while still being able to benefit if NEM prices are lower than anticipated. A cap at $300 per MWh (the cap most commonly traded in Australia), for example, ensures a buyer using the cap to hedge a natural 'short' retail spot market position will pay no more than $300 per MWh for the agreed volume of electricity, no matter how high the spot price may rise. In Australia, a cap is typically sold for a nominated quarter—for example, January–March 2010. Base cap contracts are listed two years ahead on a quarterly basis on the SFE and regularly trade in full year strips (comprising a bundle of the four quarters of the year).

By contrast, a floor contract struck at $40 per MWh will ensure a minimum price of $40 per MWh for a floor buyer such as a generator with a natural 'long' exposure to spot prices. Retailers typically buy caps to secure firm maximum prices for future electricity purchases, while generators use floors to lock in a minimum price to cover future generation output. A collar contract combines a cap and floor to set a price band in which the parties agree to trade electricity in the future.

The range and diversity of products is expanding over time to meet the requirements of market participants.

3.2.3 Flexible volume instruments

Instruments such as swaps and options are used to manage NEM price risk for fixed quantities of electricity. But the profile of electricity loads varies according to the time of day and the weather conditions. This variation can result in significant volume risk, in addition to price risk. In particular, it can leave a retailer over-hedged or under-hedged, depending on actual levels of electricity demand. Conversely, a retailer can also earn windfall gains.

Structured products such as flexible volume contracts are used to manage volume risks. These sculpted products, which are traded in the OTC market, enable the buyer to vary the contracted volume on a pre-arranged basis. The buyer pays a premium for this added flexibility.

7 The OTC market can theoretically support an unlimited range of bilaterally negotiated product types.

8 While caps and floors are technically options—they are effectively a series of half-hourly options—they are typically linked to the NEM spot price and are automatically exercised when they deliver a favourable outcome. Other options (such as swaptions) are generally linked to forward prices, and the buyer must nominate whether the option is to be exercised.

Table 3.2 Trading volume in electricity derivatives—Sydney Futures Exchange

	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09
Total trade (TWh)	7	29	24	55	243	241	301
Increase (per cent)		341	–19	129	345	–1	25

TWh, terawatt hours.

Source: d-cyphaTrade.

3.3 Financial market liquidity

The effectiveness of financial markets in providing risk management services depends on the extent to which they offer the products that market participants require. Adequate market liquidity is critical. In electricity financial markets, liquidity relates to the ability of participants to transact a standard order within a reasonable timeframe to manage their load and price risk, using reliable quoted prices that are resilient to large orders, and with sufficient market participants and trading volumes to ensure low transaction costs.

Indicators of liquidity in the electricity derivatives market include:

> the volume and value of trade
> open interest in contracts
> the transparency of pricing
> the number and diversity of market participants
> the number of market makers and the bid–ask spreads they quote
> the number and popularity of products traded
> the degree of vertical integration between generators and retailers
> the presence of financial intermediaries in the market.

This chapter focuses mainly on liquidity indicators relating to trading volumes, but also considers open interest data, pricing transparency, changes in the demand for particular derivative products, changes in the financial market's structure, and vertical integration.

3.4 Trading volumes in Australia's electricity derivative market

There is comprehensive data on derivative trading on the SFE, which is updated daily in real time. The OTC market is less transparent, but periodic survey data provide some indicators of trading activity.

3.4.1 Sydney Futures Exchange

Financial market vendors such as d-cyphaTrade publish data on electricity derivative trading on the d-cypha SFE electricity futures market. Table 3.2 and figure 3.3 illustrate volume trends. Trading levels accelerated from 2005–06, with 345 per cent growth in 2006–07. They flattened in 2007–08, but again rose in 2008–09, when they exceeded 300 terawatt hours (TWh) for the first time (despite relatively flat underlying electricity demand).

In 2008–09 Queensland accounted for 35 per cent of traded volume, followed by Victoria (34 per cent) and New South Wales (30 per cent). Liquidity in South Australia has remained low since 2002, accounting for around only 1 per cent of volume (figure 3.4).

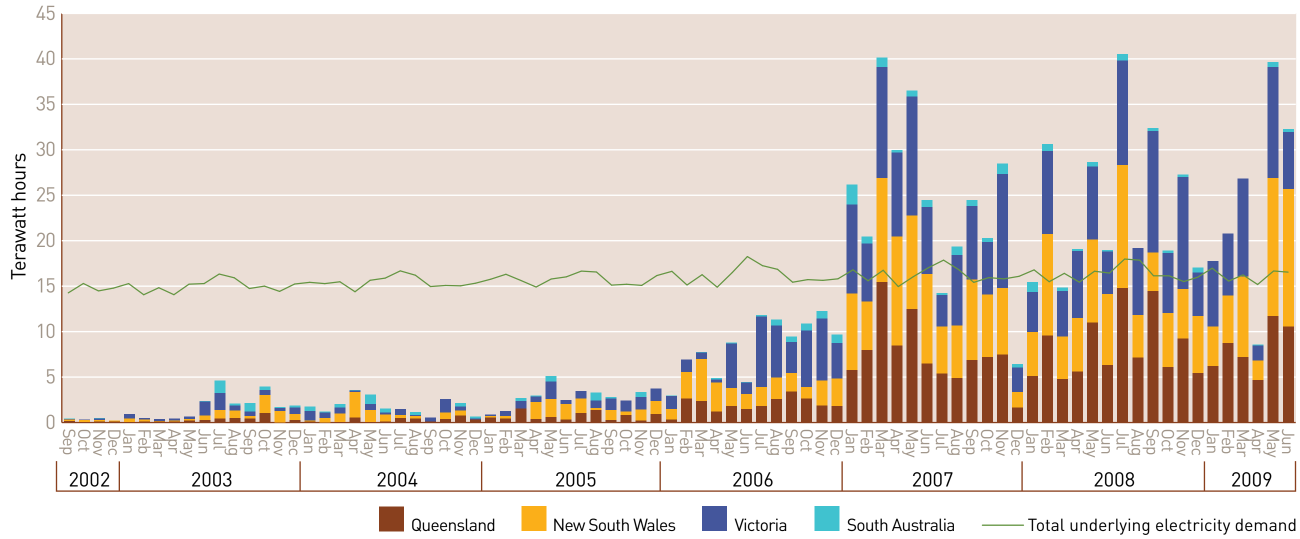
Trading on the SFE comprises a mix of futures (first listed in September 2002) and caps and other options (first listed in November 2004). Trading in options increased from around 16 per cent of traded volumes in 2007–08 to around 38 per cent in 2008–09.[9]

Figure 3.5 shows trading volumes for 2010 contracts recorded a step increase from around August 2008, with significant activity in options. The swing towards options applied to all products and continued throughout 2008–09. It might have reflected the need

9 d-cyphaTrade, *Energy focus, FY review 2008/2009*, Sydney, 2009.

Figure 3.3

Regional trading volume in electricity derivatives—Sydney Futures Exchange



Source: d-cyphaTrade.

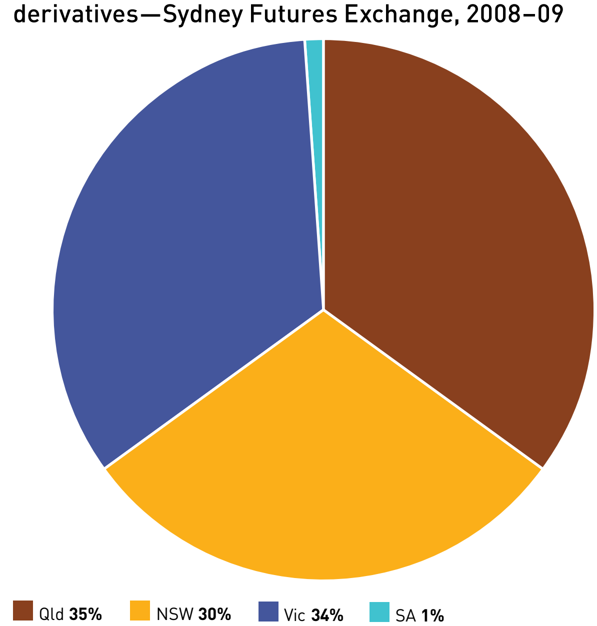
for market participants to hedge in an increasingly uncertain market, particularly given the planned introduction of the Carbon Pollution Reduction Scheme (CPRS) in 2010. Trading in options remained strong, however, despite the Australian Government's decision to delay introducing the CPRS to 2011.

During 2008-09 the d-cypha SFE electricity options market grew to become one of the largest electricity options markets in the world, trading 115 TWh—the equivalent of 58 per cent of underlying NEM demand.

Figure 3.6 shows the composition of futures and options trade on the SFE in 2008–09 by maturity date. The SFE trades quarterly futures and options out to four years ahead, compared with three years in many overseas markets.[10] Liquidity was highest for contracts with an end date between six months and two years from the trade date. Only a relatively small number of open contracts have an end date beyond 2.5 years. This timing is consistent with the trading preferences of speculators and the time horizons of electricity retail contracts, of which the majority are negotiated for one year and which rarely run beyond three years. Some retailers do not lock in forward hedges beyond the term of existing customer contracts.

Figure 3.4

Regional shares of trading volume in electricity derivatives—Sydney Futures Exchange, 2008–09

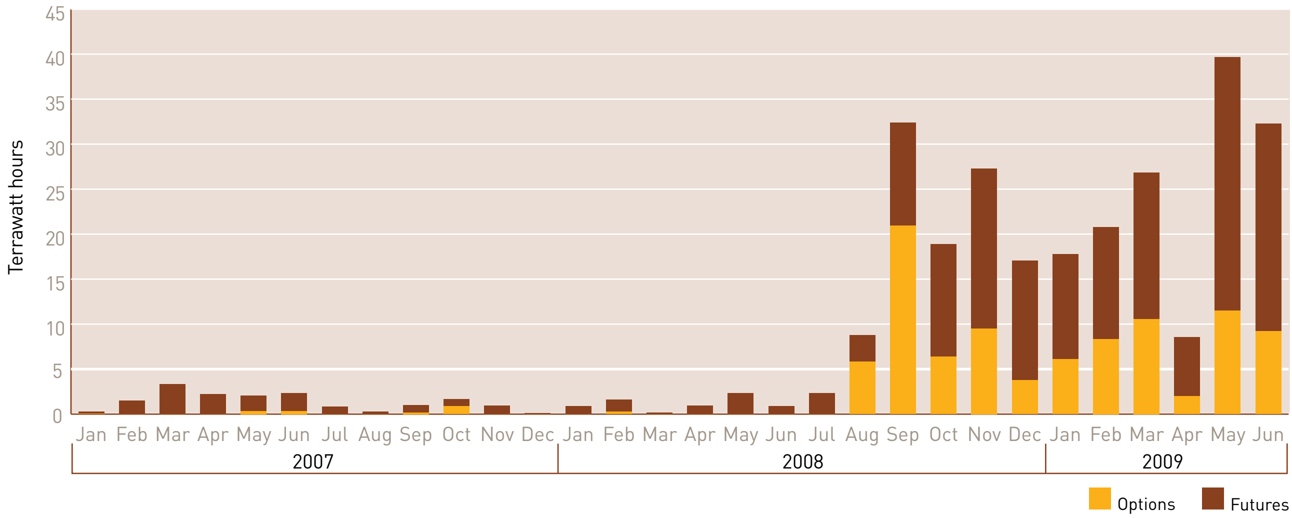


Source: d-cyphaTrade.

10 See, for example, www.eex.de (Germany) or www.powernext.fr (France).

Figure 3.5

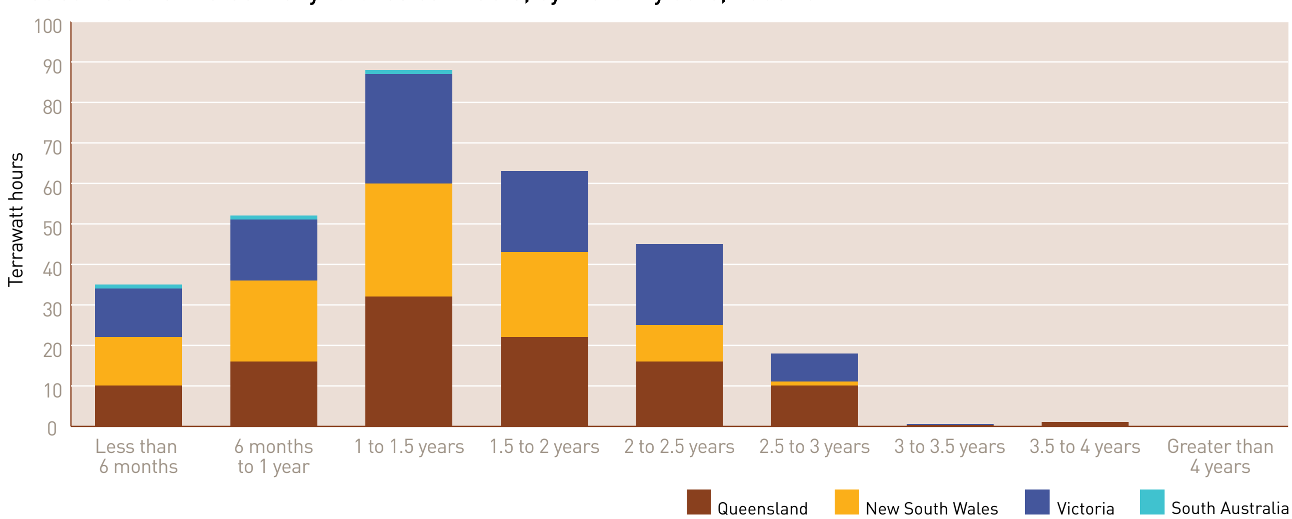
Traded volume for 2010 contracts—Sydney Futures Exchange



Source: d-cyphaTrade.

Figure 3.6

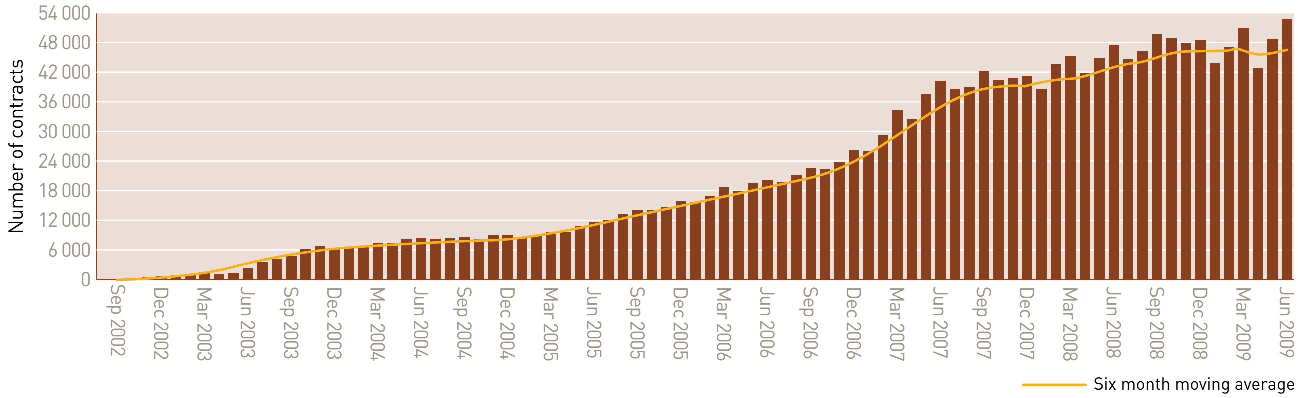
Traded volume in electricity futures contracts, by maturity date, 2008–09



Source: d-cyphaTrade.

Figure 3.7 illustrates open interest in electricity futures on the SFE over time. Open interest refers to the total number of futures and option contracts that have been entered and remain open—that is, have not been exercised, expired or closed out—at a point in time. An increase in open interest typically accompanies a rise in trading volumes and reflects underlying demand growth. As figure 3.7 illustrates, open interest for SFE electricity futures increased from 2002 to late 2008, before levelling out over the remainder of 2008–09. The number of open contracts rose from around zero in 2002 to over 52 000 in June 2009.

Figure 3.7
Open interest on the Sydney Futures Exchange



Source: d-cyphaTrade.

3.4.2 Over-the-counter markets

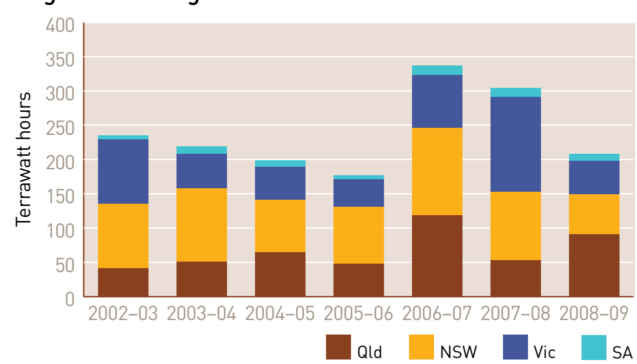
Data on liquidity in the OTC markets are limited because transactions are visible only to the parties engaged in trade. The Australian Financial Markets Association (AFMA) conducts an annual survey of OTC market participants on direct bilateral and broker assisted trade. It reports that most, but not all, participants respond to the survey. The AFMA data will capture a particular OTC transaction if at least one party to the trade participates in the survey.

As figure 3.8 indicates, total OTC trades declined from around 235 TWh in 2002–03 to around 177 TWh in 2005–06. This trend was reversed in 2006–07, with turnover increasing by more than 90 per cent to around 337 TWh. Volumes remained above 300 TWh in 2007–08 but fell significantly to around 208 TWh in 2008–09.

On a regional basis, trading volumes rose by more than 70 per cent in 2008–09 in Queensland, accounting for around 44 per cent of trade across all regions (up from around 17 per cent in 2007–08). Turnover remained steady in South Australia, but fell by 65 per cent in Victoria and 40 per cent in New South Wales.

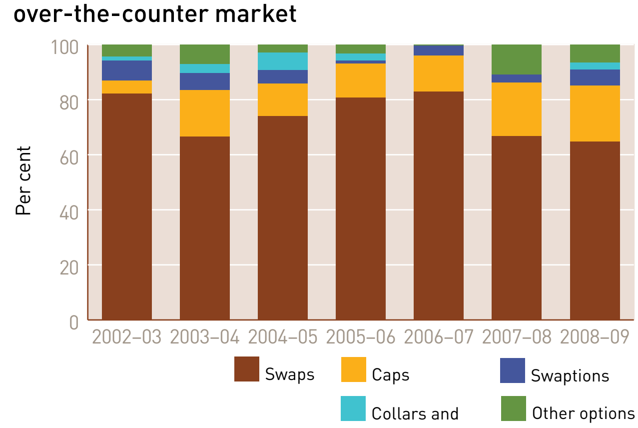
As in 2007–08 the bulk of OTC trade in 2008–09 was in swaps (around 65 per cent) and caps (around 20 per cent). Swaptions and other forms of options made up the balance (figure 3.9).

Figure 3.8
Regional trading volumes—over-the-counter market



Source: AFMA, *2009 Australian financial markets report*, Sydney, 2009.

Figure 3.9
Trading volumes, by derivative type—over-the-counter market



Source: AFMA, *2009 Australian financial markets report*, Sydney, 2009.

3.4.3 Aggregate trading volumes

Table 3.3 aggregates volumes of electricity derivatives traded in OTC markets and on the SFE, and compares these volumes with underlying demand for electricity in the NEM. The data are a simple aggregation of AFMA data on OTC volumes and d-cyphaTrade data on exchange trades. The results must be interpreted with some caution, given the AFMA data are based on a voluntary survey and are not subject to independent verification, and thus could omit transactions between survey non-participants (although AFMA considers the survey captures most OTC activity).

Derivative trading volumes can exceed 100 per cent of NEM demand, because some financial market participants take positions independent of physical market volumes and regularly re-adjust their contracted positions over time.

Table 3.3 Volumes traded in over-the-counter markets and the Sydney Futures Exchange

	OTC (TWH)	OTC (% OF NEM DEMAND)	SFE (TWH)	SFE (% OF NEM DEMAND)	TOTAL (% OF NEM DEMAND)
2001–02	168	96	0	0	96
2002–03	235	131	7	4	135
2003–04	219	118	29	16	134
2004–05	199	106	24	13	118
2005–06	177	92	55	28	120
2006–07	337	174	243	124	298
2007–08	304	156	241	123	279
2008–09	208	105	301	153	258

NEM, National Electricity Market; OTC, over-the-counter; SFE, Sydney Futures Exchange; TWh, terawatt hours.

Note: NEM demand excludes Tasmania, for which derivative products were not available.

Sources: AEMO; AFMA; d-cyphaTrade.

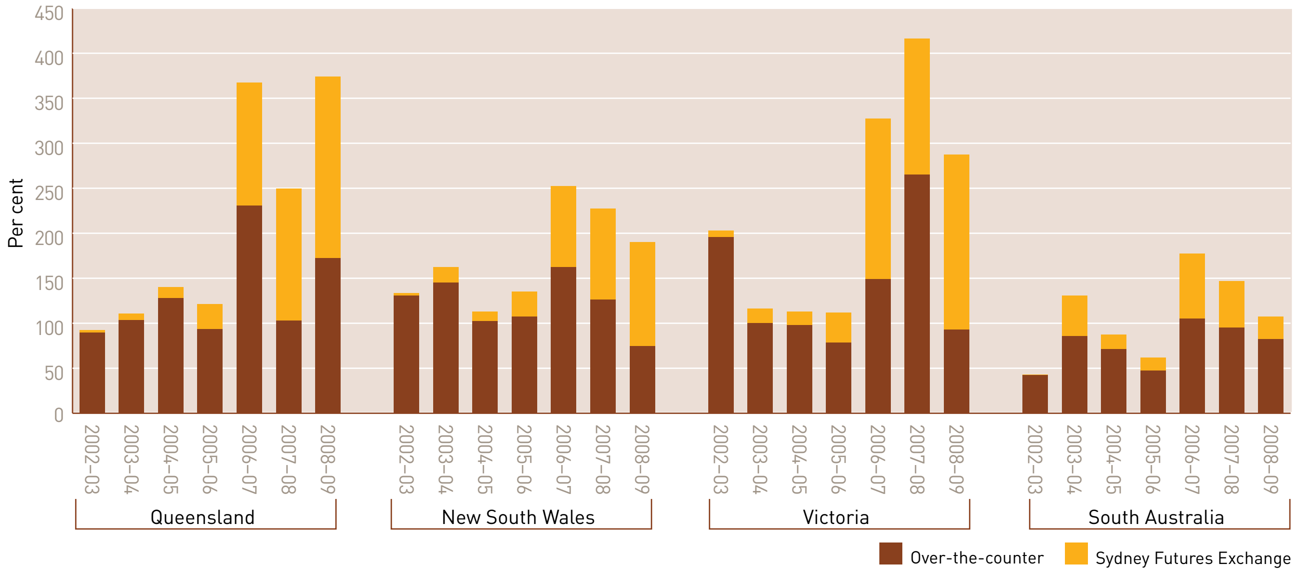
Based on the available data, the volume of financial trading in the SFE in 2008–09 exceeded volumes in the OTC market for the first time. The share of derivative trading in OTC markets declined from 97 per cent in 2001–02 to just 41 per cent in 2008–09. As table 3.3 indicates, OTC trades in 2008–09 were equivalent to 105 per cent of NEM demand, compared with a record 174 per cent in 2006–07. Volumes on the SFE rose from near zero in 2001–02 to levels equivalent to over 150 per cent of NEM demand in 2008–09. Across the combined OTC and exchange markets, trading volumes in 2008–09 were almost 260 per cent of NEM demand, down from almost 300 per cent in 2006–07 but still well above volumes in the preceding years.

There are a number of reasons for the relatively strong growth in exchange traded volumes. Amendments to the Corporations Act and the introduction of international hedge accounting standards to strengthen disclosure obligations for electricity derivatives contracts might have raised confidence in exchange based trading. In addition, d-cyphaTrade, in conjunction with the SFE, redesigned the product offerings in 2002 to tailor them more closely to market requirements. These changes have encouraged greater depth in the market, including the entry of financial intermediaries.

The increase in trading volumes on the SFE has also been driven by some trading parties seeking to minimise mark-to-market OTC credit exposures. This issue became more acute in the difficult economic conditions in 2008–09, where a perception of increased financial risk for energy market participants might have accelerated the shift from OTC to SFE trading.

Figure 3.10 charts regional trading volumes in both the OTC and SFE sectors as a percentage of regional NEM demand. Trading volumes were generally equivalent to around 100–150 per cent of regional NEM demand in Queensland, New South Wales and Victoria from 2002–03 to 2005–06. Volumes rose sharply in 2006–07 to 370 per cent of NEM demand in Queensland, 330 per cent in Victoria, 250 per cent in New South Wales and 180 per cent in South Australia. In 2008–09 only Queensland experienced growth in trading volumes relative to regional NEM demand, reaching a record for the region of almost 375 per cent. Volumes in other regions were below levels for the past two years.

Figure 3.10
Regional trading volumes as a percentage of regional National Electricity Market demand



OTC, over-the-counter; SFE, Sydney Futures Exchange.

Sources: AEMO; AFMA; d-cyphaTrade.

The SFE trading volumes in 2008–09 exceeded OTC volumes in all regions except South Australia—the first time this has occurred in Victoria and New South Wales. Victoria's SFE trades accounted for over two thirds of regional trading volumes. In Queensland and New South Wales, SFE trade accounted for around 54 per cent and 61 per cent of trading volumes respectively. In South Australia, SFE trade fell from a high of 41 per cent in 2006–07 to 23 per cent in 2008–09.

A PricewaterhouseCoopers survey of market participants in 2006 raised possible reasons for poor liquidity in South Australia's financial markets. Reasons cited included the relatively small scale of the South Australian electricity market; perceptions of risk associated with network interconnection, generation capacity and extreme weather; and perceptions of high levels of vertical integration.[11]

3.5 Price transparency and bid–ask spread

While trading volumes and open interest indicate market depth, part of the cost to market participants of transacting is reflected in the bid–ask spread (the difference between the best buy and best sell prices) quoted by market makers and brokers. A liquid market is characterised by relatively low price spreads that allow parties to transact at a nominal cost.

d-cyphaTrade and other market data providers publish bid–ask spreads for the exchange traded market. In 2008–09 most spreads for base futures products were less than $3. Spreads are generally higher in the market for peak futures, which tends to be less liquid.

3.6 Number of market participants

Ownership consolidation, such as vertical integration across the generation and retailer sectors, can affect participation in financial markets. Vertical integration can reduce a company's activity in financial markets by increasing its internal capacity offset risk.

11 PricewaterhouseCoopers, *Independent survey of contract market liquidity in the National Electricity Market*, Sydney, 2006, p. 28.

The three largest private energy retailers—Origin Energy, AGL Energy and TRUenergy—are moving towards portfolios more balanced between generation and retail assets. In 2007 AGL Energy acquired the 1260 MW Torrens Island power station in South Australia from TRUenergy, in exchange for the Hallett power station (150 MW) and a cash sum. Origin Energy is quickly expanding its generation portfolio, commissioning the Uranquinty power station (650 MW) and expanding its Quarantine plant (130 MW) in 2008–09. It has also committed to a further 1250 MW of gas fired generation in Queensland and Victoria. All three businesses also have ownership interests in Australian wind farms. In addition, major generator International Power operates a retail business in Victoria and South Australia (trading as Simply Energy) and has achieved significant market penetration.

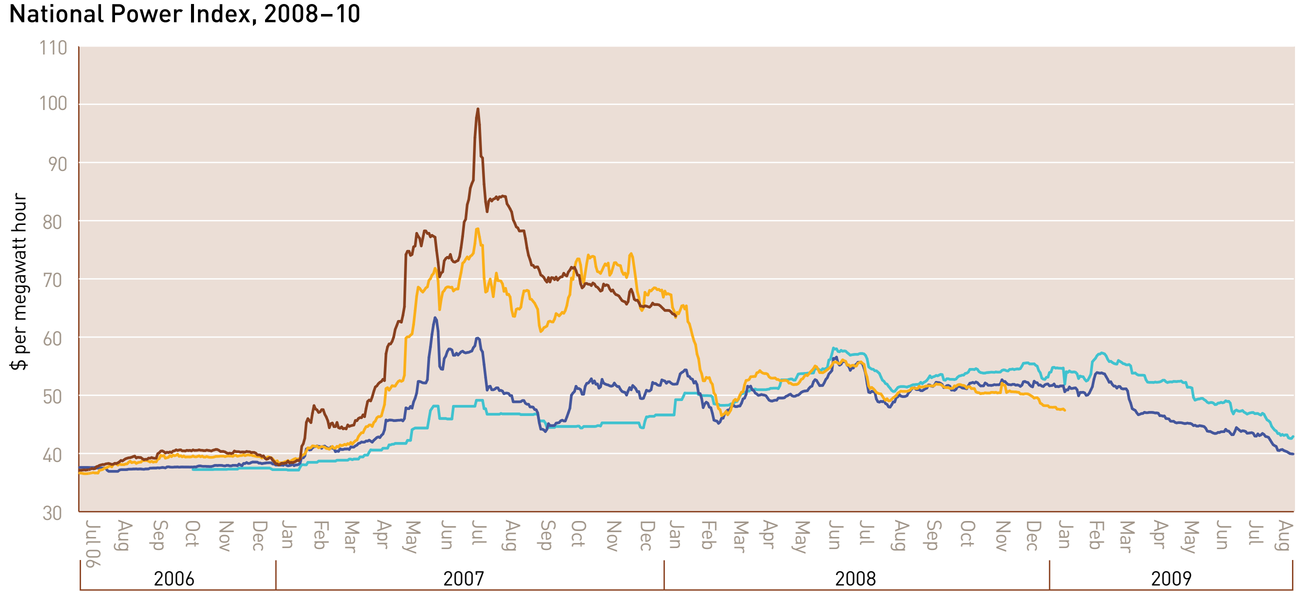
While integration might have reduced the number of generators and retailers in Australia's financial markets, new entry by financial intermediaries continues to add depth to the market.

3.7 Price outcomes

Base futures account for most SFE trading volumes and open interest positions. Accordingly, the following discussion of price outcomes focuses on base futures. Prices for peak futures tend to be higher than for base futures, but follow broadly similar trends.[12]

Figure 3.11 shows average price outcomes for electricity base futures, as reflected in the National Power Index (NPI). The index is published by d-cyphaTrade for each calendar year and represents a basket of the electricity base futures listed on the SFE for New South Wales, Victoria, Queensland and South Australia. It is calculated as the average daily settlement price of base futures contracts across the four regions for the four quarters of the relevant calendar year. The NPI data are available from June 2006 and are published daily. d-cyphaTrade also publishes a Eastern Power Index that excludes South Australian futures.

Figure 3.11
National Power Index, 2008–10



Source: d-cyphaTrade.

12 Base futures cover 0.00 to 24.00 hours, seven days per week. Peak futures cover 7.00 am to 10.00 pm Monday to Friday, excluding public holidays.

Figure 3.11 shows base futures prices were fairly flat throughout 2006, trading between $35 and $40 per MWh, before rising sharply in the first half of 2007. Prices for the 2007 calendar year basket peaked in June 2007 at close to $100 per MWh. This peak mirrored high prices in the physical electricity market, caused by tight supply–demand conditions (see section 2.5). Futures prices also rose sharply for the 2008 calendar year, but less so for later years (reflecting expectations that the tight supply–demand conditions at that time would be relatively short term).

A return to more benign conditions in the physical electricity market led to an easing of 2007 and 2008 base futures prices in the summer of 2007–08. Prices converged at around $50–55 per MWh over 2008. Prices fell further over the first half of 2009, to less than $45 per MWh for 2009 calendar year base futures. For the 2010 calendar year, base futures were trading at around a $5 premium over the 2009 product. But following the announcement in May 2009 of a delay in the introduction of the CPRS from 2010 to 2011, the premium for 2010 contracts fell from a high of around $6–7 per MWh to $2–3 per MWh at June 2009.

In general, contract markets often trade at a premium to the physical spot market for an underlying commodity. On average, base futures prices on the SFE traded at a fairly constant premium over NEM spot prices of around $2 per MWh over the past four years.[13]

3.7.1 Future forward prices

Figure 3.12 provides a snapshot in June 2009 of forward prices for quarterly base futures on the SFE for quarters up to two years from the trading date. These forward prices are often described as forward curves. The first four quarters of a forward curve are the prompt quarters. For comparative purposes, forward prices in June 2008 are also provided.

In June 2009 prices were generally down on the levels of 2008. This might have reflected lower demand projections for the coming year (particularly for summer) and the commissioning in 2008–09 of almost 2500 MW of new generation capacity. South Australia was the exception, with generally higher futures prices in 2009 than in 2008. This may indicate market concerns that high prices in South Australia's physical electricity market over the past two summers—as a result of high temperatures, interconnector constraints and opportunistic bidding by generators—may recur.

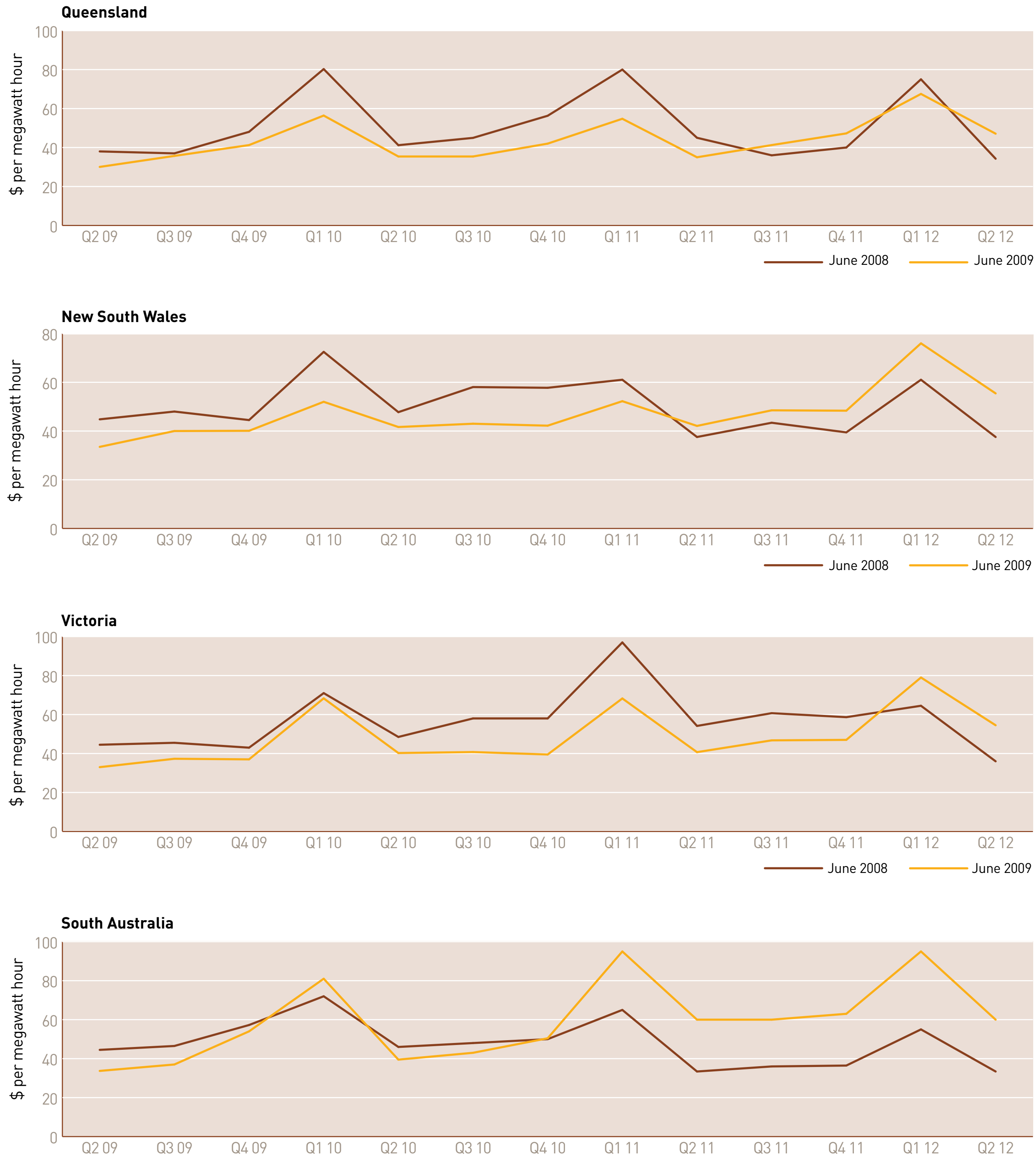
Figure 3.12 also illustrates that futures prices tend to be higher for the first quarter (Q1, January–March) than for other quarters. This reflects the tendency for NEM spot prices to peak in summer—when hot days lead to high demand for air conditioning, tightening the electricity supply–demand balance—and illustrates the links between derivative prices and underlying NEM wholesale prices.

The introduction of the CPRS is expected to put upward pressure on wholesale prices, as evident in rising forward prices from the third quarter of 2011 (relative to the same quarters in the previous year). For most regions, an initial price shift of around $5–6 per MWh was evident for the third and fourth quarters of 2011, rising to $10–14 in 2012. In Victoria, there is a larger increase in prices for the first quarter of 2012, perhaps reflecting concerns that the supply–demand balance in the electricity market may be tight at that time unless planned new capacity such as Origin Energy's 518 MW plant at Mortlake are operational. Poor liquidity in South Australian futures products makes it difficult to assess market expectations for that region.

While futures contracts typically relate to a specific quarter of a year, contracts are increasingly being traded as calendar year strips, comprising a 'bundle' of the four quarters of the year. This tendency is more pronounced for contracts with a starting date at least one year from the trade date. Figure 3.13 charts prices in June 2009 for calendar year futures strips to 2012. In June 2009 all regions had forward curves in strong contango—that is, prices are higher for contracts in the later years.

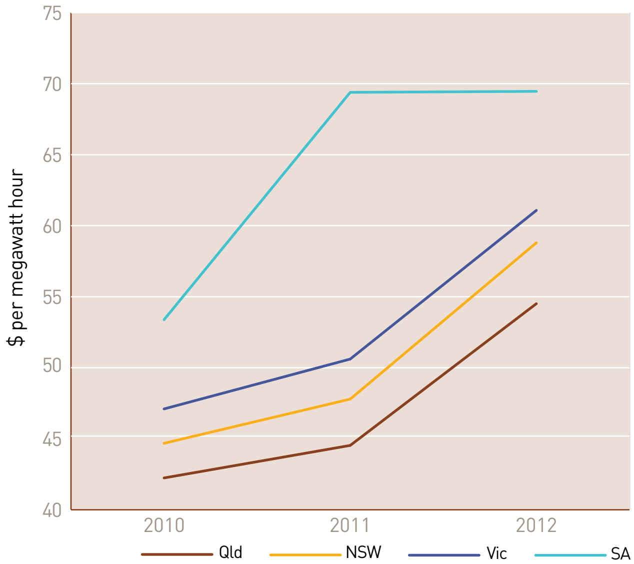
13 Based on a comparison of time weighted calendar year wholesale market spot prices to the average NPI value for each calendar year.

Figure 3.12
Base futures prices, June 2008 and 2009



Source: d-cyphaTrade.

Figure 3.13
Base calendar strip at June 2009



Source: d-cyphaTrade.

This is indicative of market expectations that price risk may be greater in the medium to longer term, and is consistent with an expectation that the CPRS may increase pool prices from 2011. The market may also be factoring in assessments of supply adequacy in some regions. South Australian prices are considerably above those for other regions, perhaps reflecting ongoing concerns about price risk in the wholesale market.

3.8 Price risk management—other mechanisms

Aside from financial contracts, other mechanisms can manage price risk in electricity wholesale markets. As noted, some retailers and generators have reduced their exposure to NEM spot prices through vertical integration. In addition:

> In New South Wales, the Electricity Tariff Equalisation Fund (ETEF) provides a buffer against prices spikes in the NEM for government owned retailers that are required to sell electricity to end users at regulated prices. When spot prices are higher than the energy component of regulated retail prices, ETEF pays retailers from the fund. Conversely, retailers pay into ETEF when spot prices are below the regulated tariff. The New South Wales Government has announced it will phase out ETEF over 2010–11.

> Auctions of settlement residues allow for some financial risk management in interregional trade, although the effectiveness of this instrument has been debated (see section 5.7).