Termination fees and landholder considerations

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Introduction

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This paper is intended to assist the ACCC's understanding of irrigator planning horizons and farm management decisions, and how the magnitude of termination fees may affect these considerations.

This will provide an understanding of the 'real world' pressures that may lead irrigators in different industries and circumstances to deviate from the expected behaviour of a simplified and theoretical rational agent in responding to termination fees.

The aim is to consider how the magnitude of a termination fee is likely to affect incentives for an irrigator to trade water access entitlements, either to exit the industry or to adjust the approach of obtaining water (from one of holding entitlements to one that increasingly relies on seasonal trades).

This research is required to gain an understanding of the length of agreement for water delivery services that irrigators are likely to require, and the relative influence of the cost of water delivery services on irrigators' decisions to continue irrigation activities.

The structure of this paper is as follows:

- Section 1 defines and provides key contextual background on termination fees;
- Section 2 identifies the types of landholder/irrigator decisions that may be affected by termination fees and the broad factors that contribute to these decisions;
- Section 3 examines the influence of termination fees on these farm decisions, and recently observed behaviour; and
- Section 4 draws together the key conclusions of the analysis.

2 Background

2.1 WHAT ARE TERMINATION FEES AND RIGHTS TO WATER DELIVERY?

2.1.1 Background

A termination fee is an upfront fee payable when a landholder reduces their access to, or completely disconnects from a district's irrigation water delivery infrastructure. More precisely, a termination fee is a fee levied by an infrastructure operator when a delivery entitlement is surrendered to the infrastructure operator (thereby terminating any rights or obligations associated with that delivery entitlement, including any requirement to pay an infrastructure access fee for water delivery services). A termination fee is intended to help provide for ongoing costs for maintaining irrigation infrastructure. Termination fees are commonly set as a multiple of the relevant access fee.

A delivery entitlement means an explicit or implicit entitlement to have irrigation water delivered within an irrigation district. A delivery entitlement confers a number of benefits and costs on the irrigator. The benefits accrue from the value of enabling land within an irrigation district to be irrigated. In many cases, a delivery entitlement enables access to irrigation water delivery infrastructure at a predetermined price. If a delivery entitlement is not held, then operators may not be required to maintain the infrastructure or can mothball the channel, or irrigators may still be able to access the irrigation infrastructure, but at a higher charge. The costs associated with holding a delivery entitlement include an annual fixed fee for infrastructure access.

Rather than surrender a delivery entitlement and pay a termination fee, an irrigator can instead transfer the entitlement to another landholding. In some districts the operator may also reduce or waive termination fees if opportunities for rationalising the channel infrastructure exist. Limits may exist on how much delivery entitlement can be surrendered. For example, every MIL landholding must have at least 5 MIL shares, 5 delivery entitlements and 5 water entitlements (MIL 2007).

2.1.2 Rules governing termination fees

Termination fees are currently permitted to be up to 15 times the annual delivery infrastructure access fee. This is set out in the MDB Agreement — paragraph 6(1) of Schedule E and the Access, Exit and Termination Fee Protocol.

In 2006, the ACCC (2006) proposed a transition of this multiple to 12 and then subsequently to 8 (table 1):

> The termination fee should be a multiple of the actual annual access fee levied on the delivery entitlement at the time of termination. The termination fee should be no more than Y times the access fee (adjusted for any avoidable fixed costs and tax), where Y follows the following schedule:

Financial Year	Y
2007–08*	12.0
2008–09	11.5
2009–10	11.0
2010–11	10.5
2011–12	10.0
2012–13	9.5
2013–14	9.0
2014–15	8.5
2015–16	8.0

Table 1: Proposed transition of termination fee multiple

**includes pre 30 June 2007*

Source: ACCC 2006

2.1.3 Implementation of termination fees

The access fee basis for the multiple used to calculate termination fees varies between operators. In many cases it is the current infrastructure access fee charged to irrigators, while for Murray Irrigation Limited the termination fee is calculated as 15 times the shadow access fee[1], so that the termination fee may be more than 30 times the access fee.

Also, in some districts the rules explicitly provide that the termination fee may be reduced or waived if the water authority can avoid costs as a result of the delivery entitlement surrender through either a reconfiguration process or a channel rationalisation.

Termination fees in practice — a Victorian example

In the irrigation district operated by Goulburn–Murray Water (GMW), the unbundling process allocated delivery entitlement on the basis of units of High Reliability Water Share (HRWS) divided by 270 (number of days in an irrigation season).

For example, a farm with 690 ML of HRWS entitlement holds 2.55 ML/day delivery entitlement (690 ML/270 days = 2.55 ML/day). The theoretical termination payout figure is $44,741/ML/day (for the example landholder it would cost $114,338 to surrender all delivery rights). This can be compared to an annual fee of $2,982/Ml/day for the infrastructure access fee. Notably, the termination fee is 15 times the infrastructure access fee.

In GMW, a farm without delivery entitlement can continue to irrigate but will pay the casual use fee of $51/ML rather than $6/ML (with sufficient delivery entitlement). Importantly, farms can use 2.7 times their HRWS before paying the casual use fee.

Farmers are being advised (by valuers) to retain at least 1.0 ML/day of delivery entitlement even when they sell off permanent water to ensure access to casual use and retain the opportunity to buy water back in. If all the delivery entitlement is surrendered from a property, the operator is not obliged to maintain the delivery infrastructure or it may be mothballed.

To date, there has only been one case of the full 15x termination fees being paid in Victoria — in the case of sale of a deceased estate — although several negotiations are known to have occurred where the irrigation infrastructure has been rationalised in exchange for waiving future delivery entitlement fees. If termination fees are virtually never being paid, then the absolute value of these fees may be less important. However, by establishing a reference point, they provide incentives for alternative negotiations between the landholder and infrastructure operator. In such negotiations there may be considerable asymmetries between the parties, such as regarding information for potential

[1] the fixed access fee that would be charged if fixed access fees were set to recover all fixed costs and no variable costs (i.e. if variable access fees were set at a level to recover all variable costs and no fixed costs).

reconfiguration or channel rationalisation opportunities, giving operators the advantage.

Termination fees in practice, in SA and NSW

In Murray Irrigation Limited the termination fee is $382.95 per entitlement.

In Central Irrigation Trust managed districts in South Australia, there is a termination fee of $303 per megalitre. In addition, when retiring land from irrigation it will be a requirement to disconnect the service by having the meter removed by CIT (current cost $350). There are also requirements to pay any Catchment Environment Levies.[2]

This paper focuses on the effect that termination fees may have on landholder decisions. A separate but nevertheless important issue is how irrigators' decisions to terminate their delivery rights affect remaining farmers in an irrigation district under alternative termination fee arrangements. In particular, the level of the termination fee may determine the extent to which the unavoidable costs of infrastructure that once serviced exiting irrigators are borne by remaining irrigators through higher infrastructure charges. The appendix to this paper examines this issue in further detail with particular reference to the ACCC's proposed approach of setting a cap on termination fees equivalent to 8 times the infrastructure access fee.

3 Framework for irrigator decision making

There is a range of decisions that could be influenced by termination fees in some way. The two key decisions that are directly influenced by termination fees are:

- Whether or not to exit from agriculture; and
- If continuing to farm, choosing the appropriate water asset portfolio.

These are considered more closely in sections 3.1 and 3.2, respectively.

More broadly, a range of factors will affect each irrigator's decisions regarding water trading and delivery entitlements. Issues of future outlook, financial position, discount rates and time horizons are discussed further in following subsections. Other factors include:

- *Business objectives* – some farmers will be aiming to grow and develop, others might be seeking to maintain production at the current level, while others may be planning an exit strategy from the industry, particularly in ageing family farming businesses without a succession plan. Any farm-related

[2] In the year that a water allocation is traded, there is no change to the environment catchment levy because it is based on the water allocation as at 1 July of that year (except for water traded from interstate when it is payable for the whole year). In subsequent years, the new water allocation as at 1 July is used for the environment catchment levy. If an irrigator is permanently selling water out of a CIT district the balance of the year's levy must be paid.

investment may also be more profitable and efficient if it occurs at a particular point in the business cycle, such as where it can be combined with other investments or changes. These factors will have a major influence on the propensity to undertake new investment at any particular time and for any lifestyle decisions.

- *Risk aversion* – each farmer will have different attitudes towards adopting new approaches to their business, taking on risk, and increasing their levels of debt.
- *Perceptions and intangibles* – personal views and societal norms play a key role in determining adoption of any investment option.
- *Understanding and uncertainty* – understanding and likelihood of the profitability implications of any investment decision for their business both now and into the future.
- *Strategic behaviour* – farmers may avoid making investments or take a certain course of action if they believe it could lead to other, more favourable outcomes in the future or a deferral of inevitable adverse outcomes. Strategic behaviour is particularly important in regard to responses to government policies and actions.
- *Industry characteristics* – dairy, mixed farming / cropping and grazing, horticulture, rice.
- *Availability of alternative farming income* – dryland farming and balance of annual and perennial pastures, as well as off-farm income.

The following discussion examines three overarching influences on irrigator decision-making, namely future outlook; individual irrigator's financial position; and time horizons.

3.1.1 Future outlook

Every farmer will have a different outlook for the future that will influence expectations regarding future profitability. Factors that influence farmers' outlooks include:

- Commodity prices and outlook
- Government buybacks
- Infrastructure rationalisation/modernisation
- Climate change, and
- Expectation of capital gain.

Commodity prices and outlook

Water trade patterns generally reflect commodity prices and prospects. Trade in water has coincided with major changes in marketing arrangements for irrigated commodities (dried vine fruit and dairying), episodes of severe drought, and changes to taxation and other policy settings. As an example, Australian milk production peaked at about 12 billion litres in 2001/02 and has fallen roughly 25

per cent since then due almost entirely to adverse seasonal conditions. Total production in 2007/08 is expected to be about 9 billion litres. Since deregulation in 2000, farm-gate milk prices have been determined largely by export commodity prices, modified by exchange rates. The 2007/08 season has seen the biggest shift in world dairy commodity prices in the last two decades, buoying dairy production in the face of limited water availability and high input costs.

Future output and input prices determine the future profitability of a given irrigated enterprise. Continuing confidence in dairy prices may bolster investment (or at least slow exit) in this particular industry, while in comparison expectation of flat dried vine fruit prices and increasing import competition may hasten adjustment in this particular industry.

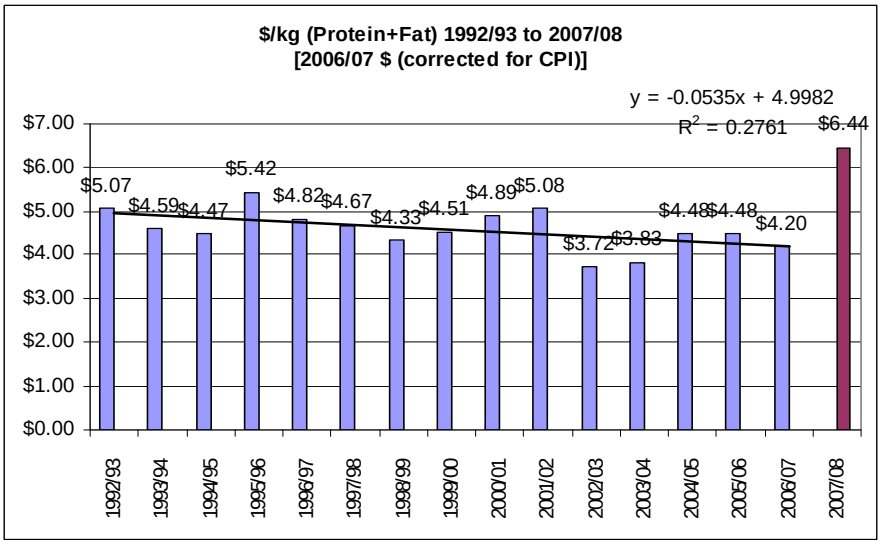

Figure 1: Milk price and trend line from 1992/93 to 2007/08 (A$2006/07)

Government buybacks

Government buybacks are changing the amount of water entitlement available for irrigation purposes. Examples include the MDBC Pilot Environmental Water Purchase of 20GL, Federal Government purchases totalling $50 million to secure 35GL (DEWHA 2008), NSW Riverbank purchases, South Australia Water Recovery Package purchase of 10GL, and future Government buybacks will also be influenced by the COAG decision to change the 4% rule on entitlement transfers to a 6% threshold.

Infrastructure rationalisation/modernisation

Infrastructure reconfiguration and modernisation is another feature of changing water assets in operator managed irrigation districts. By changing the underlying cost structures of the supply system, these projects have implications for the future water delivery prices in each region and therefore incentives for trade. The transition from an old to a new system provides an opportunity for water users to reassess their water-use strategies in light of future changes in

infrastructure costs and levels of service. Where they choose to reduce delivery entitlement, this can result in avoided upgrade costs, which in turn can provide justification to reduce or offset termination fees. Recent examples of existing or planned modernisation projects include Stage 1 of the FoodBowl Modernisation Project in Northern Victoria and COAG's in-principle agreement to fund projects in Murray-Darling Basin States.

Climate change

Uncertainty about future climate/water allocation is likely to raise expectations of water scarcity and higher future prices. Reduced local rainfall reduces non-irrigated pasture growth and also increases the need for irrigation water on irrigated paddocks. Drought conditions lead to lower water allocations. This reduces the ability to produce home-grown fodder from pastures and crops. Drought conditions also reduce the supply of substitutes such as grain, hay, grazing and temporary irrigation water. This results in much higher prices for these inputs. Ultimately, the increased expectation of drought may hasten exit decisions.

Expectation of capital gain

Some farmers will choose to trade unprofitably in expectation of future capital gain, or choose not to sell for fear of foregone future capital gain.

3.1.2 Financial position

Each farmer will have a different level of debt versus equity, face slightly different costs of capital, have a different level of reliance on off-farm versus on-farm income, and have a different propensity or ability to take on more debt. Relatively higher levels of debt and poor cashflow may reduce investment. Farmers also consider overall wealth effects, such as impacts on the capital value of their land and water.

A weak financial position might influence farmers to take decisions that are not ultimately profitable. Consultation with irrigation industry consultants suggest that, in many cases, family farms do not use Operating Profit or Return on Capital as business performance measures. Over recent difficult seasons (low commodity prices, low water allocation, high input costs) there have been frequent situations where, as a result of tight cashflow, farmers have made decisions that ultimately have hurt profit and recovery very badly. There is considerable evidence that the traditional farming philosophy based on cashflow and partial productivity measures fails in situations where rapidly changing circumstances dictate that a change in business direction is required. The implication of this is that many farmers' responses to short-term cost increases may very well appear irrational in profit terms as they are largely based on cashflow considerations. This applies especially to smaller farmers as in general they have the tightest cashflow and have limited options. They also often have the poorest understanding of the economic implications of their decisions. Also, some farm decision-making does not include the opportunity cost of the

landholder's time (this means that there is often unpriced family labour contributions).

On dairy farms, most day-to-day decisions are driven by cashflow and by partial productivity measures (e.g. tonnes of dry matter (DM)/ha or per ML, production per cow or per ha). Historically, this has been a very successful strategy. The underlying philosophy has been to develop a simple production system and develop as fast as cashflow will permit. The result has been the accumulation of substantial wealth over a lifetime of farming for the successful ones.

Higher costs, from any source, will be seen as increasing uncertainty and risk and exacerbating poor cashflow in difficult seasons and weakening farmers' financial positions. For example:

- in 2002/03, the price of milk fell by 30 per cent, feed cost more than doubled and water allocation on the Goulburn system fell to 29 per cent. Most farms produced cash deficits, lost equity and increased debt levels, despite substantial Government assistance.
- for 2008/09 (and 2 or 3 years beyond) the outlook is for higher milk prices but the outlook for water allocation and feed costs is extremely uncertain.

In horticulture, waves of optimism and pessimism affect industry forecasting, the formation of price expectations and therefore investment. Horticultural products are vulnerable to cycles in production and prices because of long lead times and the concentration of producer expectations around the same price forecast. Horticultural demand is also strongly related to income. This is especially true of demand for specific varieties or specific quality standards. Nonetheless, price-based substitution is ubiquitous; consumers will buy apples if bananas are judged to be too expensive and vice-versa. But trends in consumer tastes are also a powerful force in horticultural industries as can be seen in the near random changes in preferences for different varieties and styles in the wine industry.

The supply price of water is not a big cost compared with the costs of other horticultural inputs. Tree crops represent a major investment in long-lived capital assets with lengthy lead times. Irrigated vegetable production requires substantial investment in on-farm infrastructure. Once those costs are sunk, labour and the operation of capital dominate annual costs.

3.1.3 Discount rates and time horizons

The discount rates used in irrigators' investment decisions will depend partially on risk preferences and attitudes to sunk costs, costs of capital and opportunity costs. They will also depend on the specific characteristics of the crop or crops in question. Each crop has different physiological risks (time to peak yield), agronomic risks (time to break-even) and market risks (presence or absence of minimum price contract). In addition, Carey and Zilberman (2002) found investment decisions regarding the adoption of irrigation technology to be especially sensitive to the degree of uncertainty in future water prices. The greater the uncertainty, the larger must be the expected benefit before a farmer is willing to invest.

Those cognisant of sunk costs, capital costs and opportunity costs, when contemplating a new unproven crop (higher growing risk) with no minimum price contract (high market risk), might use a discount rate of 15–20 per cent.

Those not cognisant of sunk costs, costs of capital and opportunity costs, when contemplating a proven crop with a minimum price contract, might use a discount rate of 10–15 per cent or even less.

Industry consultants often use a risk discount rate of 5–8%, but current significant uncertainty about the future of irrigated farming (Garnaut 2008) will act to increase this due to a required risk premium. Such discount rates are applied in excess of the landholder costs of borrowing (i.e. prevailing interest rates for farm lending). Consequently, potential horticultural investors might use overall discount rates ranging between 10 and 20 per cent.

There is no single time period over which irrigators assess farm decisions. The relevant time horizon, instead, is based on the characteristics of the decision (such as asset life) being made. Time horizons for investment in the development of an existing business are influenced by the likelihood of redundancy and the rate of relevant technological change that determine the effective life of an asset. For example, investments significantly affected by technological change:

- Centre-pivot irrigation water delivery systems (approx. 10-15 year asset life)
- Dairy shed (approx. 7 year asset life)
- Dairy milking plant (approx. 10 year asset life)

Investments significantly less affected by technological change:

- A deep bore (approx. 20 year asset life)
- Drainage reuse channels (approx. 50 year asset life)
- Concrete slab and building (approx. 20 year asset life)

Appropriate time horizons for decisions concerning planting trees and vines are determined also by the time to maturity/production. For example, grapevines might produce a marketable yield in 3–4 years, whereas pears might take 18 years. The rate of change of consumer tastes is also important, for example fresh stonefruits may be replanted every ten years due to changing consumer varietal demands.

The economic life of orchards for fresh fruit has been reducing in recent years as markets have become increasingly dynamic and producers try to keep up with the changes. In contrast, in dried fruit and nut crops, this has been less of an issue and the economic life of these crops tends to be longer.

Citrus and other tree crops generally have an economic-life expectancy of around 25 years although there are wide variations around this average. For example, in horticulture:

- The adage to 'plant pears for your heirs' is testimony to the long economic-life (upwards of 80 years) and long timeframes to reach full production (18 years or so under traditional systems) for pear trees. This is especially true for canning varieties. The market for pears centres on a small number of

varieties, and controlled atmosphere storage means that they are available on the fresh market year-round. As existing orchards reach the end of their economic lives, they will likely be replaced by higher-density plantings since these generate a positive return on capital much more quickly.

- Up until ten years ago, the story for apples was similar to that for pears, but increasingly the market is showing interest in different coloured and different flavoured apples. Moreover, although controlled atmosphere storage means year-round supply on the fresh market, the market is responsive to the availability of new season apples. This is encouraging growers to experiment with different varieties that are ready for harvest at different parts of the season. Consequently, the average economic life of apple varieties is falling.
- The economic-life of stone fruit varieties is also trending down rapidly. Growers have embarked on an ongoing and highly competitive quest to find a series of varieties that will enable them to exploit every harvesting window of opportunity from November through to April. Increasingly, stonefruit growers are starting to view the productive life of each successful new variety as being about ten years from full production onwards. Totally unsuccessful stone fruit varieties will be pulled out within a couple of years of planting. Stone fruit growers expect to make very high profits from successful varieties in the first three years, but during that period, other growers will recognise the potential of that variety and start to plant it. Consequently the initial three high profit years will be followed by five years of reasonable profit and two years of declining profit, after which those trees will be pulled out and replaced with the next variety.
- The economic life of grapevines is also changing. It currently lies somewhere between that of stonefruits and pears. Up until the 1980s it was not uncommon to find dried-fruit plantings of the 1880s, 1910s and 1920s still in production. The transition from dried-fruits to table grapes and winegrapes was buffered by the flexibility of sultana vines. (Sultanas made neutral wine that, up to a point, could be blended with other varieties without noticeable effect. Sultanas could also be sprayed with gibberellic acid to produce 'Thompson Seedless' table grapes.) As the Australian winegrape, table grape and dried-fruit markets matured the opportunities for niche varieties, the benefits of different rootstocks and the need for market-specific trellises meant that plantings had to be replaced and, often, replaced again. It is not yet clear what the economic life of a modern vineyard might be.

Strategies to improve the management of this variation include the use of different growing systems for different crops — for example, high density plantings of pear trees, can help to offset physiological characteristics and thereby bring forward production and marketable yields. Decisions may also be staggered across the entire landholding to ease the lumpiness of the effect on farm management — such as redevelopment that is done in a series of blocks related to harvestable area (see box).

Framework for irrigator decision making

Staged redevelopment in horticulture

For winegrapes, there is a quantum size for that part of the vineyard that might be redeveloped at any one time. Harvesting is undertaken at night and modern harvesters can cover about four hectares in one night. It makes sense therefore to base irrigation shifts and redevelopment units on multiples of four hectares. Consequently, if, hypothetically, a 20 hectare vineyard had an average economic life of 20 years, it would make sense to redevelop four hectares every five years, on average

Keeping in mind the wide variety of influences and dimensions to the time horizon of irrigator decision-making, 15 years may constitute a representative length of time consider whole-of-farm prospects in horticulture and dairy. Fifteen years has also been a historically important timeframe, with some jurisdictions renewing water licence arrangements (at the discretion of the relevant minister) upon their expiry every 15 years.

4 Influence of termination fees on farm decisions

Termination fees primarily affect decisions regarding exit from agriculture — with the associated sale of farm assets of land, water access entitlements and capital — and the decisions of irrigators that continue to farm about water entitlement ownership, delivery and use.

4.1 TERMINATION FEES AND EXIT DECISIONS

An exit decision for an irrigator to sell up and leave agriculture is based on comparing the expected returns from continuing irrigated agricultural production, expected returns from alternative agricultural options (such as dryland farming) and the expected returns from exiting agriculture and selling farm assets. This decision may be prompted by a shock that reduces farm profitability, such as drought or a fall in the output price of the commodity produced. This same shock reduces the value of the farm as a going concern, and consequently the total asset value of the farm holdings. Termination fees will also influence the total asset value of the farm holdings.

The prime components of the farm assets are land, water and farm capital. The change in the value of these asset types depends on their characteristics, and degree of specialisation of the asset use. The less specialised the asset, the less bound to an industry's success is its value:

- In the case of land assets, some of these considerations include:
  - Suitability for other irrigated crops;
  - Suitability for dryland farming; and

- Notably, suitability for grazing and cropping which are land uses that can either rely on rainfall or be supplemented by irrigation (if water is cheap or the product is particularly valuable).

- In the case of water assets, some of these considerations include:
  - The water market price in the broader water trading district;
  - The local water market within the district, which may be dominated by the landholder's/irrigator's current industry activity; and
  - Notably, access to the broader water market for permanent sales of water access entitlements may be restricted by the 4%/6% rule. This limits any water sale to the local water market only.

In the case of farm capital assets, considerations include the industry specific nature of the machinery — such as (specialised) rotary dairy equipment compared to (less specialised) tractors or utes.

Exit decisions are generally considered as long-run decisions and will take into account expectations of future influences, rather than just a reaction to current season conditions (Appels, Douglas and Dwyer 2004). This includes decisions on exit from agriculture, or changes in the mixture of all outputs and all inputs to achieve an enterprise that meets their financial and personal needs. Even if an irrigator leaves agriculture, the land will often not remain idle. The new owner will make decisions about which mixture of outputs and inputs will meet their financial and personal needs.

The decision to exit farming will often be based on the total value attainable for all farm assets, including both land and water. This is because the decision to leave farming corresponds to the decision to leave the land and move on. This means that farming families often need to raise funds to relocate and cashflow/credit constraints may not permit some farm assets to be sold while others are kept. Therefore, termination fees affect the decision to exit because they can impact on the total value of farm assets.

Barr (2008, unpublished) noted that when land and water were bundled together, very little adjustment occurred at the peak of a drought or other crisis because the benefit of exit (the value of farm assets) were at their minimum — sellers are not willing to accept a price significantly below the long-term average, except in extreme cases of bank foreclosure. It was only when expectations of improvement lifted the value of farm assets that could be realised from selling out that adjustment speeds increased with the increase of property transactions.

If water and land can be traded separately, then land values suffer during the crisis but water may hold its value or even increase in value due to trading possibilities to other industries and regions. Insomuch as the stronger performance of water assets permits a significant return from exiting at the peak of a crisis, this speeds adjustment.

Termination fees link the decision to sell land with the decision to sell water, such that the decision to sell water requires consideration of whether the land should remain encumbered by delivery entitlement payments, or a termination

Influence of termination fees on farm decisions

fee should be paid. As discussed below, the value of land can be altered by delivery entitlement encumbrances. Consultation with land valuers has suggested, however, that the market does not currently seem to be fully discounting land value by the value of the termination fee that may be payable.

The direct effect of termination fees on asset value

Since the prices of farm inputs other than land and water are determined exogenously to the region, the market prices for land and water are the 'swing instruments'. For example, all else being equal, the second block of land away from the river is worth the same as the first block from the river — minus the present value of the extra pumping costs and any extra capital costs. Similarly, all else being equal, the market value of a block of land in an irrigation district where delivery charges are high will be worth the same as a block of land in a district where charges are low — minus the present value of the difference in annual delivery charges.

Any across-the-board increase in the annual cost of water delivery could simply be reflected in a reduction in the capital cost of water via the market price of entitlements, without changing the marginal incentives to trade water. In contrast, inter-district differences in water charges can lead to altered incentives for water trading as well as effects on the value of other inputs that rely on water use (such as irrigable land).

The difference between termination fees and exit fees is their incidence — exit fees directly 'tax' water entitlement transfers out of a district whereas termination fees are directly related to the decision to no longer deliver water to a given landholding. This means that for termination fees, the direct link to the value of water is broken because water trade and termination of delivery entitlement do not necessarily occur together (because a landholder may retain their delivery entitlement and source water from allocation markets, while selling their water entitlements). This contrasts with exit fees where the net value of water is directly affected by its market price, less broker fees and exit fees.

Water assets constitute a significant proportion of farm assets. A typical dairy farm's assets consist of about 60% water, 30% land and 10% farm capital. Rice and mixed agricultural farms are even less capital-intensive whereas horticulture is more capital-intensive. The proportion of asset value held in water has grown with the increase in the market value of water assets (see box).

The increasing importance of water assets

In the early years of trading of water assets (1987–95), the key to the exit decision was the value of the farmhouse and the fixed investments on the farm. Without water, these were worth very little (Barr 2005). Mixed farmers generally estimated they required between $700 and $1000 per megalitre to compensate for the sunk cost of the house and fixed improvements (Barr 1999).

Recent experience is of water becoming a much higher proportion of total farm assets for most farmers. This proportion has changed from around 30% of total farm assets in 1996 (the first year of extensive water trading in Victoria) to over 60% on typical dairy farms in 2008. One point that should not be overlooked is that the permanent water trading market is relatively immature. It has evolved rapidly in a period of uncertainty for other major influences on farm profitability including climatic conditions, commodity prices and changes in the regulatory environment.

Movements in water asset value

Prices paid in the market for permanent water should not reflect immediate fluctuations in supply and demand for water and commodity prices, as was found for prices in the market for temporary water (Bjornlund and Rossini 2004). The purchase of a long-term water entitlement is a capital investment and should therefore reflect more long-term factors in the economy and long-term trends in commodity prices and supply factors (Bjornlund and Rossini 2006).

However, in practice, the capital value of water appears to have been quite strongly influenced by scarcity, at least while the cause of scarcity exists. For example in 2002/03, with a low allocation on the Goulburn system, the price of permanent water increased by about 50% in a single season. This price increase was close to the previous season's value plus the inflated value of temporary water within that season. In the following season when scarcity was less of an issue, permanent water prices dropped back to mid-way between the pre- and peak 2002/03 price.

The termination of delivery entitlements is directly related to the decision to continue irrigating or to no longer irrigate land and undertake dryland pursuits. This means that the scope for alternative land use options are important in exit decisions. Alternatives with potentially different termination fees consequences include:

- Expectation of regular irrigation;
- Expected likelihood of opportunistic irrigation (either via retained delivery entitlement or casual infrastructure use); and
- Drying off the land and ceasing irrigated production.

There are broad cycles in the movement of land asset values but one of the key drivers is drought. Land values stagnate and transactions slow during drought periods. This means that the pressures that may contribute to individual exit

decisions by landholders are likely to correspond to the conditions under which land assets are devalued or the level of difficulty of selling at a price considered 'reasonable' by owners.

Termination fees and land value

As noted above, the land market does not currently seem to be fully discounting the value of land that retains a delivery entitlement by the value of the termination fee that may be payable. Reasons for this include the benefits that connection to a delivery system bring (rather than just the stream of access costs) as well as the teething issues the land market may be having in adjusting to new termination fee arrangements.

Benefits of connection and retention of delivery entitlement include access to low cost irrigation water delivery services for ongoing regular irrigation activities or opportunistic irrigation, and opportunities to reduce or waive the cost of termination via negotiation with the irrigation infrastructure operator. More importantly, connection generally enables irrigated production to occur rather than production decisions being limited to dryland opportunities — irrigation opportunities provide potentially lower risk and higher value production since water inputs from rainfall can be supplemented.

The newness of termination fee arrangements means that the land market is still adjusting to the consequences. There may be a lack of knowledge or understanding by land buyers and their lawyers of the status of a piece of land and of what delivery entitlement payment obligations and termination fees entail — a number of such reports have appeared in the Weekly Times. There is also little precedence for the actual payment of termination fees. As mentioned above, there is only one case of the full 15x termination fees being paid in Victoria. This means that the market expectation may currently be that termination fees act as the method of last resort, providing incentives for alternative arrangements for disconnection to be sought. There may also be information asymmetries in negotiations concerning termination fees and other alternative arrangements to surrender delivery shares — operators own and manage the delivery infrastructure and will be better able (than landholders) to determine the type of rationalisation or reconfiguration that can be achieved if delivery entitlements are terminated.

The movement from exit fees to termination fees has more closely linked the liability for ongoing delivery infrastructure access to the land asset rather than to the water entitlement. In the example of the dairy industry, which has a representative distribution in value between farm assets of water (60%), land (30%) and farm capital (10%), the shift from exit fees to termination fees has resulted in the value of the (termination/exit) fee having a larger proportional impact on the asset value due to it being applied to a smaller base.

4.2 ONGOING FARM DECISIONS

Termination fees can affect not only exit decisions, but also the decisions of irrigators who are continuing to farm and are reassessing their water portfolio management.

The elements of a water portfolio include the unbundled products associated with water ownership, delivery and use. These include water shares, delivery entitlements and water use licences.

Irrigators can chose to obtain water via the traditional mechanism of holding water entitlements, via seasonal spot markets, or through a combination of both. Limited-term leases arrangements are also possible. The desirable balance of these different water asset types held by an irrigator is determined by their risk preferences and the characteristics of their crop water demands. Bjornlund and Rossini (2006) analyse the interactions between entitlement and allocation trade prices and note that the expected long-term trends in seasonal water allocation prices drive entitlement value rather than trends over short periods.

Irrigators may also reassess their portfolio of delivery entitlements that facilitate delivery of this water in response to the unbundling processes that have and continue to occur around the definition of water rights.

Termination fees are unlikely to significantly impact on decisions on the portfolio of water assets to be held given that any alternative mechanism to source water would still require delivery. Termination fees would, however, be expected to be taken into account when reassessing the portfolio of delivery entitlements.

Delivery entitlement management

There are three broad categories of agricultural land within irrigation districts. These categories are:

- Land that is expected to be irrigated;
- Land that is opportunistically irrigated; and
- Land that has been dried-off from irrigation and is not expected to be irrigated again.

The mix of delivery entitlements held to deliver the expected water demands to these types of land depends on the expected costs and benefits of irrigation and the optimal choice of delivery entitlement to complement this expected irrigation behaviour.

If irrigation proceeds, the cost of delivery entitlements should be compared to termination fees, and the cost of delivery with and without delivery entitlements. The net cost of retaining delivery entitlements is based on the expected infrastructure access fees that would be payable, less the termination fee or other costs of surrender that would be payable if the delivery entitlements were not retained. The benefit of retaining delivery entitlements is derived from the lower delivery prices if irrigation occurs as well as the value of the potential for water delivery in the case that surrendering delivery entitlements leads to irreversible

disconnection from the delivery infrastructure (i.e. that there is no opportunity for casual usage).

The expected likelihood and extent of future irrigation activity determines the probability of receiving benefits associated with irrigation proceeding. For example, in the case of land that is opportunistically irrigated, the probability of receiving benefits is related to the probability that water will be abundant and thus available at a low seasonal price.

The characteristics of land, such as soil type and configuration, also affects the alternatives that exist for dryland farming, which depend on soil type, location and farm layout.

Finally, the specification of delivery entitlements will affect the optimal choice of delivery entitlement to complement this expected irrigation behaviour. Importantly, the volume of water entitled to be delivered under one unit of delivery entitlement specifies the amount of delivery service provided and how much low cost delivery can be received before casual usage fees or capacity constraints are incurred. For example, each parcel of Delivery entitlements in GMW provides an Annual Delivery Allowance equivalent to 270% of that volume (GMW 2008).

4.3 RECENT OBSERVED VIEWS AND BEHAVIOUR

There is considerable uncertainty about the future of irrigation in the MDB, reflecting uncertainty over future water allocation, climate change and commodity prices. This is the dominant contributing factor to land and water value, with the delivery entitlement / termination fee issue only a secondary consideration.

The delivery entitlement issue impacts land values only and not water values, with buyers starting to baulk at purchasing land with delivery entitlement but no water access entitlement. This behaviour is starting to impact where intensive agriculture is not the (next) highest value land use (e.g. in a sale for rural residential use or non-irrigated cropping). This is the transition for landuse out of irrigated production.

Some buyers are writing down property values by virtually the full amount of the delivery entitlement capitalised value / termination fee. This is especially true on less desirable blocks (i.e. poor irrigation layout, less valued soil types). There is almost no write-down on good properties.

The market appears to be generally poorly informed about the impacts of termination fees. A number of cases have been reported where buyers using solicitors unfamiliar with water trading have ended up with a property with delivery entitlements and the associated ongoing access fees. Because the concept of termination fees is relatively new to land and water markets, these fees may not be fully taken into account by buyers and sellers. The maturity of this understanding may increase over time, but is still hampered by the lack of information (such as any uncertainty about taxation treatment).

Some farmer-buyers have transferred delivery entitlements to a home block when selling water permanently off an outblock. Part of the logic behind this is to ensure delivery in times of rationing. A few farmers on systems that are likely to be rationed are considering buying extra delivery entitlement to reduce the impact of future rationing (although none are known to have done so).

More generally, the incentives provided by the price signals for delivery infrastructure access fees may have been recently dulled by government subsidies as part of exceptional circumstances / drought assistance.

5 Conclusions

Termination fees will directly affect land value, which affects the total value of farm assets if a decision to exit the industry is being made. Therefore, termination fees will impact on exit decisions and the associated sale of water entitlements.

Termination fees will also affect the amount of delivery entitlements held to service different types of agricultural land within irrigation districts. This will be the case for land that is expected to be irrigated, land that is opportunistically irrigated and land that is dried-off from irrigation and not expected to be irrigated again.

The decision to terminate will be influenced by the alternative costs, of a termination fee and a series of access fee payments, as well as the expected benefits irrigators/landholders derive from holding delivery entitlements.

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Consultation:

Industry consultation and direct input from Ian Gibb personal experience as dairy farm management consultant, Tim Cummins experience as horticultural economist and adviser, Wes Ridd, GV Property Services (highly regarded, experienced valuer), David McKenzie, HMV (highly regarded, experienced valuer).

Appendix: Numerical example of cost pass through

How material is the effect of partial recovery of fixed costs, via termination fees, on remaining customers? How material is the adoption of the 10 times rule for farm profitability?

BACKGROUND

Termination fees are a way for operators to recoup some or all of the unavoidable fixed costs associated with running an irrigation scheme when farmers terminate access to irrigation water delivery infrastructure. If the farmers had remained connected to the infrastructure, then their ongoing infrastructure access fees would have covered these fixed costs. Termination fees are predicated on the assumption that the exiting irrigators have an obligation to meet some or all of these future costs.

The multiple that represents the NPV of the future stream of infrastructure costs depends on such factors as the selected discount rate, and the choice of the length of the economic or engineering life of the irrigation infrastructure.

It is common for regulators to express allowable termination fees as a multiple of the infrastructure access fee. The Murray-Darling Basin Agreement Schedule E protocol on access, exit and termination fees established a maximum multiple for terminations fees of 15 times the access fess. The ACCC Draft Water Charge (Termination Fees) Rules recommend a termination fee multiple of 10 times in conjunction with the review of the rules being brought forward.

The choice of the regulated termination multiple sets the balance of cost sharing between terminating irrigators meeting some or all of these future costs, and remaining irrigators and the infrastructure operator bearing additional future costs as demand for the infrastructure reduces and other irrigators terminate.

The calculations in this appendix consider the effect of termination on the access fees and farm profits of remaining irrigators, as well as the effect of the rule change (15 times to 10 times) on these values. These calculations also assumes *the existing infrastructure layout* will continue into the future — being the least cost method of servicing remaining irrigators.

There are sometimes opportunities for the infrastructure to be rationalised or reconfigured when irrigators terminate their connection. This is because the existing arrangements may not be the least cost way to provide irrigation delivery services to the remaining irrigators. Accordingly, the ACCC position has been to cap the termination fees that may be charged to provide an incentive for irrigation operators to pursue this rationalisation/reconfiguration.

The assumption that the existing infrastructure is the least-cost method of servicing remaining irrigators may be acceptable for low levels of termination, however, as more delivery entitlement within a district is terminated it is increasingly likely that reconfiguration or rationalisation opportunities will exist.

The distribution of terminated delivery through the irrigation infrastructure network will also affect reconfiguration or rationalisation opportunities.

In the case where the existing infrastructure *is* the least cost method of servicing remaining customers, then it is not efficient to pursue rationalisation or reconfiguration. It also means that the termination fee does not fully cover the terminating irrigator's deemed share of fixed costs — such that the fixed costs paid by remaining irrigators will increase. The maximum extent of this difference is the difference between the multiple that represents the NPV of the future stream of infrastructure costs and the regulated cap on termination fees.

There have been concerns among irrigators and others that setting the termination fee based on 10 times the infrastructure access fee, the current position put forward by the ACCC, will have a disproportionately adverse impact on remaining irrigators compared with a multiple of 15 times (as set out in Schedule E).

The following examples consider the materiality of a change from a 15 times rule to a 10 times rule for termination fees on farmer profitability. It also compares the impact of the 10 times rule to other factors, such as output prices, yields and water prices.

EFFECT ON FIXED COSTS

Early research into exit/termination considered the issue as one of a stranded asset, where departure of some infrastructure users increases the costs borne by remaining users. Table 2 below calculates the residual share of unavoidable fixed costs that is borne by remaining irrigators when exiting irrigators terminate their delivery share. The example considers two cases, which assume the NPV of unavoidable fixed costs is equal to either 15 times or 20 times the access fee, while the termination fee is capped at 15 times or 10 times — in line with the Schedule E and draft ACCC rules on the cap for termination fees.

	Underlying NPV of future infrastructure costs	
	x15	x20
Under Schedule E		
Cap on termination fee (access fee multiple)	x15	x15
Maximum fixed costs between underlying NPV and cap (if current layout remains efficient)	x0	x5
Minimum proportion of fixed costs (between underlying NPV and cap) borne by terminating irrigators (if current layout remains efficient)	100%[3]	75%
Maximum proportion of fixed costs (between underlying NPV and cap) borne by remaining irrigators (if current layout remains efficient)	0%	25%
Under ACCC Draft Rules		
Cap on termination fee (access fee multiple)	x10	x10
Maximum fixed costs between underlying NPV and cap (if current layout remains efficient)	x5	x10
Minimum proportion of fixed costs (between underlying NPV and cap) borne by terminating irrigators (if current layout remains efficient)	67%	50%
Maximum proportion of fixed costs (between underlying NPV and cap) borne by remaining irrigators (if current layout remains efficient)	33%	50%
From rule change		
Increase in proportion of fixed costs borne by remaining irrigators resulting from rule change	33%	25%

Table 2: Residual fixed costs borne by remaining irrigators, from rule change

In the examples above, *maximum* fixed costs borne by remaining irrigators are reported — opportunities for infrastructure rationalisation may reduce this towards zero, or further. Given a limiting case where the current infrastructure layout continues to be the least cost solution (and it is not efficient to rationalise) then:

- The Schedule E 15 times cap on termination fees requires exiting irrigators to bear the majority of their deemed share of fixed costs — remaining irrigators face <0%[4] of the terminating irrigators' deemed share if the underlying NPV is 15 times, or <25% of the terminating irrigators' deemed share if the underlying NPV is 20 times.
- The draft ACCC 10 times cap on termination fees requires exiting irrigators to bear the majority of their deemed share of fixed costs— remaining irrigators face <33% of the terminating irrigators' deemed share if the

[3] It may be great than 100% if remaining irrigators capture reconfiguration benefits.

[4] it may be negative if reconfiguration benefits are captured by remaining irrigators.

underlying NPV is 15 times, or <50% of the terminating irrigators' deemed share if the underlying NPV is 20 times.

Based on an underlying NPV of 15 times, the rule change from 15 times (Schedule E) to 10 times (the ACCC Draft Rule) results in additional costs being borne by remaining irrigators (an additional 33 per cent of the deemed costs of termination). In the limiting case where the existing layout remains efficient, table 3 reports the effects of irrigators terminating 6 per cent, 15 per cent and 30 per cent of deliver rights in a district.

- The lower end of 6 per cent reflects the COAG stated ambition to increase the cap on permanent trade out of districts (in a given year) from 4 per cent to 6 per cent by the end of 2009.
- 15 per cent and 30 per cent may represent termination rates over multiple years (see box discussing Loxton Irrigation Trust).
- The upper limit also reflects that it is highly likely there will be opportunities for efficient rationalisation of the system's layout beyond 30 per cent termination of delivery rights. For example, figure 2 presents the projected change in costs in Coleambally Irrigation Co-operative Limited (CICL) as a result of termination of delivery shares.

	Degree of termination		
	6%	*15%*	*30%*
Initial delivery share	$100	$100	$100
Initial NPV of fixed costs	$1,000,000	$1,000,000	$1,000,000
Initial fixed costs per unit	$10,000	$10,000	$10,000
Initial access fee	$667	$667	$667
Remaining delivery share (%)	94%	85%	70%
Schedule E rule (15x)			
Termination fee paid	$60,000	$150,000	$300,000
Remaining NPV of fixed costs	$940,000	$850,000	$700,000
Remaining fixed costs per unit	$10,000	$10,000	$10,000
Remaining access fees	$667	$667	$667
Increase in access fees	0.0%	0.0%	0.0%
Draft ACCC rule (10x)			
Termination fee paid	$40,000	$100,000	$200,000
Remaining NPV of fixed costs	$960,000	$900,000	$800,000
Remaining fixed costs per unit	$10,213	$10,588	$11,429
Remaining access fees	$681	$706	$762
Increase in access fees	2.1%	5.9%	14.3%
Increase in access fees from rule change	*2.1%*	*5.9%*	*14.3%*

Table 3: Increase in access fee due to termination

Note: the sensitivity to 15 times assumption of the underlying NPV is examined in a following section, where calculations based on an underlying NPV of 20 times are also presented.

Loxton Irrigation Trust (LIT)

The LIT business plan has an allowance for a 1% decline in water [entitlement] each year… If current water, commodity and economic conditions were to continue into the medium term (1 to 5 years) it is considered likely that the [current] 4% cap on permanent trade would be reached each year. If the cap were to be lifted a reduction in [entitlements] between 15% to 30 % within 3 to 5 years may occur.

Source: quoted from CIT submission to ACCC.

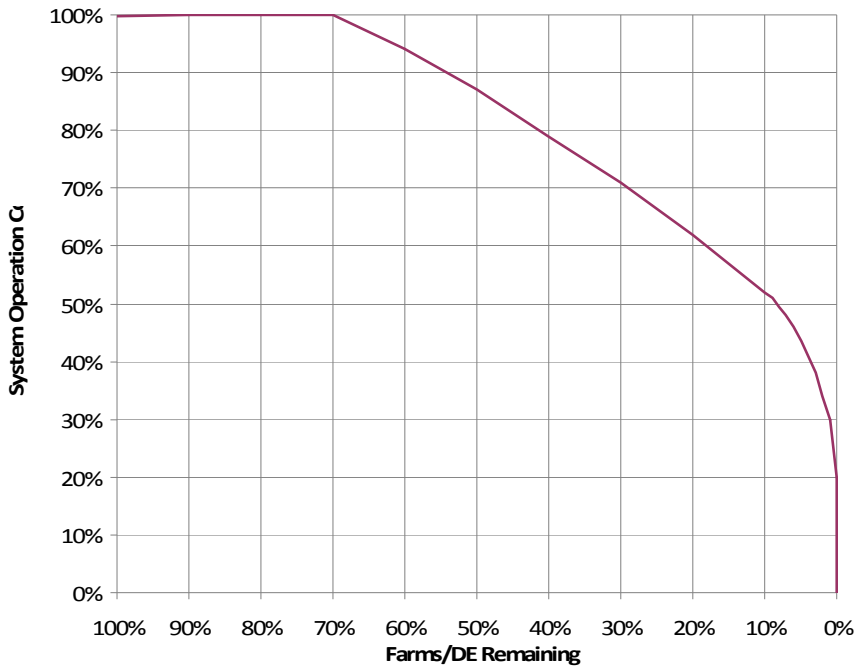

Figure 2: Change in costs as a result of termination of delivery shares.

Source: CICL submission to ACCC

The approximate pass through of fixed costs is:

$$\textit{Max \% increase in access fees} \approx \textit{\% termination} \times \textit{\% unrecovered fixed costs}$$

For larger changes in delivery share, the above approximation is imprecise — more exactly:

$$\textit{Max \% increase in access fees} = \frac{\textit{\% termination}}{1 - \textit{\% termination}} \times \textit{\% unrecovered fixed costs}$$

These maximum changes in access fees are derived from the limiting case where the current infrastructure layout continues to be the least cost solution (and it is not efficient to rationalise). More generally:

$$\textit{\% increase in access fees} = \frac{\textit{\% termination}}{1 - \textit{\% termination}} \times \frac{\textit{unit fixed costs} - \textit{termination fees} - \textit{efficient rationalisation opportunities}}{\textit{unit fixed costs}}$$

Where efficient rationalisation opportunities are zero, this collapses to the previous equations.

EFFECT ON PRODUCTION COSTS

The effect of an increase in infrastructure access fees on production decisions can be examined by looking at the relative magnitude of fixed water delivery costs as a proportion of other input costs.

Importantly, fixed water delivery infrastructure costs are only one component of total water costs — total water costs also include variable water delivery costs, property service charges and the costs of the water resource itself. (The (opportunity) cost of water as reflected in the water market can vary dramatically between seasons due to varying water availability.)

In an extremely dry year, it may be that no irrigated production occurs and no water is delivered/used. Fixed water delivery infrastructure costs, however, still have to be paid.

In a average-normal year (with 100% allocation to Victorian high reliability water shares):

- Consider a dairy farm using 270ML for irrigation, with 1 ML/day delivery share, in GMW's Central Goulburn district (service charge is $109.97, infrastructure access fee is $3038.64, infrastructure use fee is $1782.00), and the water allocation market price is $50/ML to $80/ML (see figure 3) such that the opportunity cost of the water is $13,500 to $21,600.
- Under these conditions, the infrastructure access fee (representative of fixed water delivery infrastructure costs) is 11.5% to 16.5% of total water costs. This suggests that (if 6% of deliver rights are terminated in a district, and the existing layout remains efficient) total water costs will increase by 0.24% to 0.35%.
- Given that water costs are around 60% of total dairy farm costs (see main report), this suggests that (if 6% of deliver rights are terminated in a district, and the existing layout remains efficient) total farm costs will increase by 0.15%–0.21%.
- The effects of irrigators terminating 6 per cent, 15 per cent and 30 per cent of deliver rights are presented in table 4.

	If 6% termination	If 15% termination	If 30% termination
At a water allocation price of $80/ML			
Change in total water costs	0.24%	0.67%	1.64%
Change in total farm costs	0.15%	0.40%	0.98%
At a water allocation price of $50/ML			
Change in total water costs	0.35%	0.97%	2.36%
Change in total farm costs	0.21%	0.58%	1.41%

Table 4: Effects of 6%, 15% and 30% termination

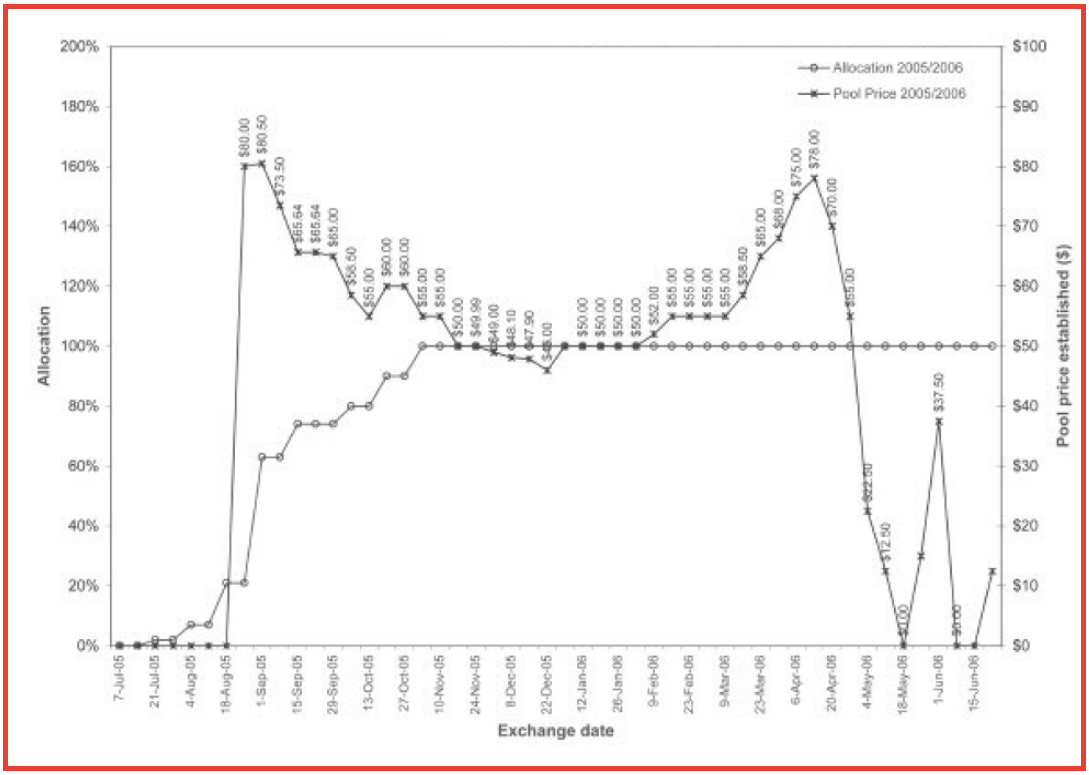

Figure 3: Water prices in 2005-06 (100% allocation)

Source: GMW 2006

EFFECT ON PROFITABILITY

Analysing the materiality of the rule change from 15 times (Schedule E) to 10 times (the ACCC Draft Rule) requires a measure of farm profitability. Because collecting and analysing detailed data on farm profitability was not feasible within the time available, we have instead used publicly available data on farm gross margins, and consider an average–normal year (compared to extreme drought conditions).

A 'gross margin' is the gross income from an enterprise less the variable costs incurred in achieving it. As a basic tool, it enables broad comparisons of the relative profitability of similar enterprises. Therefore, it is important to take care when applying gross margins to draw inferences about overall profitability. As overhead costs are excluded, comparisons of gross margins are only valid between enterprises that use similar resources (DPI NSW). In order to consider impacts on farm profits, additional costs need to be taken into account.

Our original approach was to include the opportunity cost of water as an additional cost. Adding this to a gross farm budget indicates whether an irrigator is making a greater profit from irrigating a crop compared to refraining from planting the crop and instead selling their water allocation. Water market information can provide an estimate of the prevailing water allocation price for given announced water allocations/determinations.

Coleambally Irrigation (in their response submitted 17 November, 2008) suggested an alternative approach to make gross farm budgets a more suitable measure of farm profitability was to include the fixed costs of the farm.

Using gross margin budgets and the opportunity cost of water

An example of a gross margin budget is presented in table 5. Irrigations costs are decomposed into various components and include an opportunity cost for water. The opportunity cost of water is defined as the value of water in its highest value alternative use. In irrigation areas with active water markets, the market price is a common measure of the opportunity cost of water. That is, irrigators have an incentive to only use water where the marginal benefit per megalitre exceeds what could have been earned from selling the water allocation.

We used $45 per megalitre as an indicative value for the opportunity cost of water. In 2005-06, which was the most recent year in which general security allocations exceeded 50 per cent in the Murray Irrigation Area, the prices for water allocations sold on the water exchange ranged from $34 per megalitre to $140 per megalitre. The average price for water in this year was $44.59 (see www.murrayirrigation.com.au/content.aspx?p=20021).

The following results relate to the effect on gross margins of the rule change that decreases the termination fee multiple from 15 to 10 times the infrastructure access fee (and uses an underlying NPV of 15 times). It considers the three scenarios outlined above (i.e. 6, 15 and 30 per cent reduction in delivery shares) which translate to a 2.1 per cent, 5.9 per cent and 14.3 per cent increase in the access fee, respectively. Importantly, these increases in costs only apply to a sub-component of irrigation costs (i.e. the fixed water supply charge).

The analysis covers two farming types: rice (Murrumbidgee and Murray) and grapes (Loddon). We have mainly relied on gross margins and water charges data from the NSW DPI website and the Victorian DPI/DSE.[5] However, we have augmented these data to include the opportunity cost of water ($45 per megalitre) in irrigation costs. This is indicative of production decisions in an average–normal year for water availability — the sensitivity of these results to extreme drought are considered in a later section.

The following results are indicative only and specific values are dependent on the assumed prices, yields, etc upon which they are calculated. For example, variation would be expected if the market price of water were assumed to be greater or less than $45/ML, or if the 'shadow' access fees for fixed water supply charges were used rather than the actual fees used by NSW DPI.

Item	Income/expenditure
A. INCOME: 8.50 t/ha @ $440.00 /t (on farm)	**$3,740.00**
B. TOTAL COSTS $/ha:	**$2,480.78**
Cultivation	$14.11
Sowing	$106.50
Fertilize	$256.62
Herbicide	$374.45
Insecticide	$47.00
Harvest	$202.14
Cartage	$87.21
Levies & Insurance	$89.25
Irrigation (50 per cent allocation, 15 ML/ha)	$1,303.50
fixed - water supply charge	$217.20 ($14.48/ML)
drainage charge	$43.80 ($2.92 /ML)
other charges (Gov, LWMP, AMRF)	$159.60 ($10.64/ML)
variable - water usage	$140.25 ($9.35/ML)
government	$52.80 ($3.52/ML)
supply variation	$12.45 ($0.83 /ML)
water drainage	$2.40 ($0.16/ML)
water (market) opportunity cost	$675.00 ($45/ML)
C. GROSS MARGIN (A-B) $/ha:	**$1259.22**

Table 5: Example of gross margin budget – Murray, long grain rice

Source: NSW DPI, http://www.dpi.nsw.gov.au/agriculture/farm-business/budgets/summer-crops

[5] The NSW DPI and Victorian DPI/DSE data differ in terms of what water charges are included when calculating gross margins (i.e. the NSW DPI data includes fixed water charges). For consistency, the DPI/DSE data were amended to include equivalent fixed water charges.

Results

- Total water costs (per hectare) for remaining irrigators increase by 0.37 per cent in Murrumbidgee, 0.35 per cent in the Murray and 0.46 per cent in Loddon when irrigators terminated 6 per cent of delivery share in an area. Total water cost in increased by 2.49 per cent (Murrumbidgee rice), 2.38 per cent (Murray rice) and 3.07 per cent (Loddon grapes), when irrigators terminate 30 per cent of delivery share.
- Total costs (per hectare) increase by 0.18 per cent in Murrumbidgee, 0.19 per cent in Murray and 0.03 per cent in Loddon when 6 per cent of delivery share is terminated.
- Gross margin per hectare decrease by $4.06 per hectare (0.22 per cent) in the Murrumbidgee, $4.62 per hectare (0.37 per cent) in the Murray and $4.30 per hectare (0.13 per cent) in Loddon when irrigators terminate 6 per cent of delivery share.

Crop	Change in fixed water charges	Change in total water charges	Change in total costs	Change in gross margin
	(%)	(%)	(%)	(%)
Murray rice				
6 per cent	+2.1	+0.35	+0.19	-0.37
15 per cent	+5.9	+0.98	+0.52	-1.01
30 per cent	+14.3	+2.38	+1.25	-2.46
Murrumbidgee rice				
6 per cent	+2.1	+0.37	+0.18	-0.22
15 per cent	+5.9	+1.03	+0.51	-0.60
30 per cent	+14.3	+2.49	+1.24	-1.45
Loddon hort. (grapes)				
6 per cent	+2.1	+0.46	+0.03	-0.13
15 per cent	+5.9	+1.26	+0.08	-0.36
30 per cent	+14.3	+3.07	+0.20	-0.87

Table 6: Numerical example of when 6%, 15% and 30% termination occurs

Note: The above numerical example only varies the fixed water charges and keeps all other costs constant.

To put these changes into context, we also observed:

- An increase in the market price (opportunity cost) of water from $45 per megalitre to $65 per megalitre decreased gross margin per hectare by 19.1 per cent in Murrumbidgee and 23.8 per cent in Murray.
- A decrease in the on-farm price of rice of $40 per tonne (from $440/t to $400/t) decreases gross margin per hectare by 19.7 per cent in the Murrumbidgee and 27 per cent in the Murray. While the price received for rice will vary by region and type of contract in place, figure 3 shows changes in average unit value ($/t) for rice from 1985-86 to 2005-06 to give a broad indication of price movements.

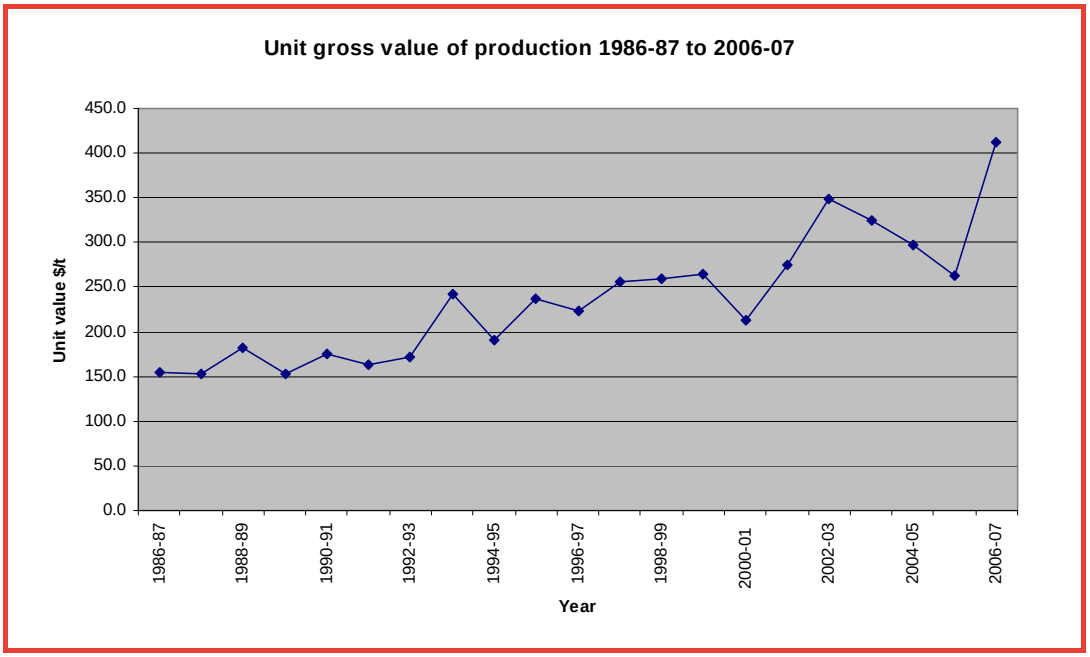

Figure 4: Gross unit value 1986-87 to 2006-07 Rice (Australia)

Source: ABARE 2007, Commodity Statistics

- A decrease in yield of rice of 0.5 tonne per hectare (from 9.25 t/ha to 8.75 t/ha in Murrumbidgee and from 8.5 t/ha to 8 t/ha in Murray) decreases gross margin by 11.7 per cent in Murrumbidgee and 17.5 per cent in Murray. For perspective, figure 4 shows that average yields in the region covering these two areas ranged from 6 to 10t/ha from 1985 to 2007.

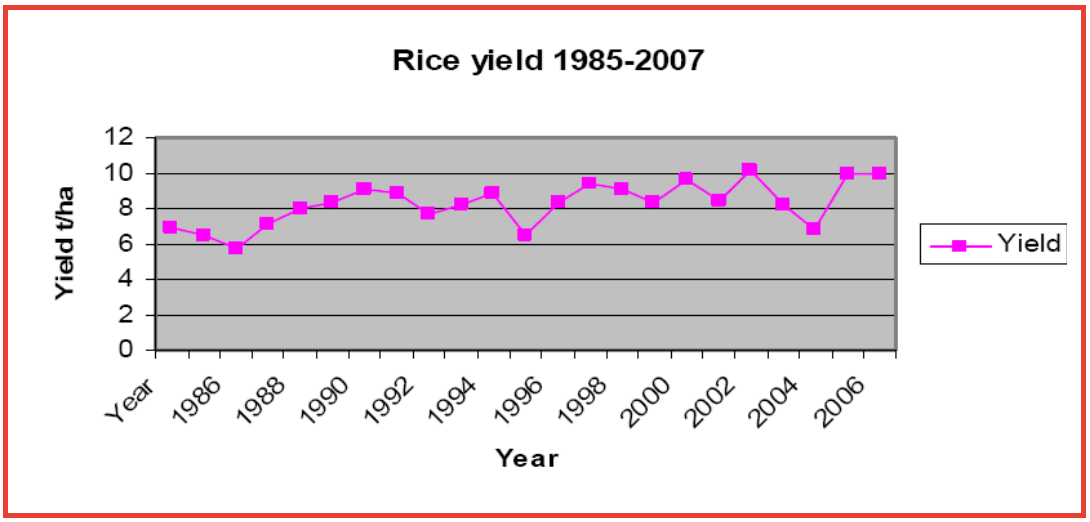

Figure 5: Average rice yields 1985-2007 in Eastern Murray Valley, Western Murray Valley, Coleambally Irrigation Area and the Murrumbidgee Irrigation Area.[6]

Source: RIRDC 2008, Extension for Improving Rice Yields and Water Use Efficiency, p.4.

- In the Murray rice example, the $4.62 per hectare reduction in gross margin, from 6 per cent termination and increase in the infrastructure access fee (arising from the difference between 15 to 10 times), is approximately equivalent to:
  - a 0.7 per cent increase (+$0.31/ML) in the market price of water, from $45/ML to $45.31/ML (i.e. $0.31/ML x 15ML/ha ≈ $4.62/ha).
  - a 0.12 per cent decrease (–$0.54) in the market price for rice, from $440/t to $439.46/t (i.e. $0.54 x 8.5 t/ha ≈ $4.62/ha).
  - a 0.13 per cent reduction (–0.0105t/ha) in yield of rice, from 8.5t/ha to 8.4895t/ha (i.e. 0.0105t/ha x $440/t ≈ $4.62/ha).

It should be noted that if variable farm costs increase or agricultural output prices fall then the gross margin of a crop would be reduced. In these circumstances the proportional effect of increased fixed water charges will be more pronounced. Focusing on water inputs and Murray rice gross margins, table 7 shows the effect of increased fixed water charges as water prices increase and the decision to irrigate becomes more marginal.

[6] While the RIRDC study covered these four irrigation areas it was unclear whether the sample used to calculate average rice yields since 1985 changed at any stage. RIRDC sourced this historical data from SunRice.

Water price ($/ML)	Gross margin ($/ha)	Effect of 2.1% increase in fixed water charges*
45	1259.22	–0.37%
65	959.22.	–0.48%
85	659.22	–0.70%
100	434.22	–1.06%
110	284.22	–1.63%
120	134.22	–3.44%
125	59.22	–7.80%
128.63	4.77	–96.88%

Table 7: Effect of varying water prices on Murray rice adjusted gross margins

**from 6% termination, and assumed 15x and 10x differences.*

Using gross farm budgets and fixed costs of the farm

Coleambally Irrigation (in their response submitted 17 November, 2008) suggested an alternative approach[7] to make gross farm budgets a more suitable measure of farm profitability was to include the fixed costs of the farm.

Table 8 provides a comparison of farm budget/profitability approaches for Murrumbidgee Valley Long Grain Rice (aerial sown) in 2007-08. By including the fixed farm costs into the gross farm margin/budget analysis, the gross margin per hectare is $1,906.76 per hectare — compared to $1,874.62 per hectare for the approach using gross margin budgets and the opportunity cost of water, and $2,549.62 per hectare directly from the DPI farm budget.

[7] compared to the inclusion of the opportunity cost of water.

	DPI Farm budget	Farm budget (incl. $45/ML water)	Farm budget (incl. fixed farm costs)
INCOME: 9.25 t/ha @ $440.00 /t	*$4,070.00*	*$4,070.00*	*$4,070.00*
B. TOTAL COSTS $/ha:	*$1,520.38*	*$2,195.38*	*$2,163.24*
Cultivation	$14.11	$14.11	$14.11
Sowing	$106.95	$106.95	$106.95
Fertilize	$293.91	$293.91	$293.91
Herbicide	$266.06	$266.06	$266.06
Insecticide.	$5.35	$5.35	$5.35
Aerial Image	$3.85	$3.85	$3.85
Irrigation (15ML/ha)	$419.10	$1,094.10	$419.10
fixed water supply cost (@50 percent allocation)	*15x $12.72*	*15x $12.72*	*15x $12.72*
variable usage costs (inc bulk) (@50 percent allocation)	*15x $14.28*	*15x $14.28*	*15x $14.28*
other fixed charges (Admin, Levy)(@50 per cent allocation)	*15x $0.94*	*15x $0.94*	*15x $0.94*
water (mkt) opportunity cost	*15x **$0.00***	*15x **$45.00***	*15x **$0.00***
Fixed farm costs*	**$0.00**	**$0.00**	**$642.86**
Harvest	$219.01	$219.01	$219.01
Cartage	$97.13	$97.13	$97.13
Levies & Insurance.	$94.91	$94.91	$94.91
C. GROSS MARGIN (A-B) $/ha:	*$2,549.62*	*$1,874.62*	*$1,906.76*

Table 8: Comparison of farm budget/profitability approaches for Murrumbidgee Valley Long Grain Rice (aerial sown), 2007-08

** The Coleambally submission suggest that, for a representative farm of 200ha with 1400ML entitlement, that a conservative estimate of fixed farm costs is $30,000 — based on 8% interest on $300,000 plus incidentals such as rates, electricity and fixed machinery costs. In a 50% allocation year, such as farm could use 700ML of water allocations to irrigate 46.7ha of rice using 15ML/ha. If the $30,000 fixed farm costs are averaged across this 46.7ha of production in a 50% allocation year, it suggests a fixed farm cost of $642.86/ha.*

Based on the above calculations using gross farm budgets and fixed costs of the farm, the effects of termination under the rule change (from 15 times to 10

times) are presented in table 9 — for the case where the underlying NPV of termination is 15 times the access fee.

	Change in fixed water charges	Change in total water charges	Change in total costs	Change in gross margin*
6 per cent	+2.1%	+1.0%	+0.2%	-0.2%
15 per cent	+5.9%	+2.7%	+0.5%	-0.6%
30 per cent	+14.3%	+6.5%	+1.3%	-1.4%

Table 9: Numerical example of when 6%, 15% and 30% termination occurs

** using gross farm budgets and fixed farm costs.*

Conclusions on termination effects on farm profitability

Given the similar magnitudes of the estimated farm profitability under the alternative methods (as represented by using gross margin budgets and the opportunity cost of water, and using gross farm budgets and fixed costs of the farm), the pass through of termination fee costs can cause effects of similar magnitudes.

When considering an average–normal year for water availability, the effects of termination on the total costs and measures of farm profitability were relatively small. The rule change (from 15 times to 10 times) would result in increased fixed infrastructure costs and would consequently reduce farm profits. However, these changes are unlikely to be sufficient to affect irrigators' production decisions in the short-term and have significantly less of an impact than changes in the market price (opportunity cost) of water, the on-farm price of the agricultural product or crop yield.

The following section considers the sensitivity of these findings to extreme drought, the charging structure of the irrigation operator (the mix of fixed and variable water supply charges) and to the underlying cost of termination (the underlying NPV of future infrastructure costs).

SENSITIVITY OF RESULTS TO EXTREME DROUGHT

In dry years, irrigation production is scaled back and farm revenues may be reduced, but the fixed water supply costs remain.

ABARE (2008) surveyed 900 irrigation farms across ten regions in the Murray-Darling Basin in 2006-07. Selected results for farm cash income[8] and farm

[8] Farm cash income is total cash receipts minus total cash costs. Total cash receipts are the total of revenues received by the business during the financial year, including revenues from the sale of crops, livestock and livestock products. Total cash costs are the payments made by the business for materials and services and for permanent and casual hired labour. It includes the value of any lease payments on capital, produce purchased for resale, rent, interest, cropping and livestock related purchases.

business profit[9] are presented in table 10, with an estimate of the fixed water supply charges added based on the average entitlement reported.

	Murrumbidgee – average broadacre farm	Murray – average broadacre farm	Goulburn-Broken – average dairy farm
Regulated surface water access entitlement	1626ML	693ML	271ML
Farm cash income	$68,397	$38 975	$17 875
Farm business profit	– $32,977	– $45 068	– $48 929
Estimated fixed water supply charges	$22,943 [a]	$6,209 [b]	$3,050 [c]

Table 10: Surveyed farm income and profitability in 2006-07

[a] *Based on CIL Water Access Fee $11.00/ML, plus C.I.M.C.L. Infrastructure Levy $3.11/ML*

[b] *Based on Water Supply Charges 7.24/ML, plus Asset Maintenance and Renewal Fund $1.72/ML*

[c] *Based on Infrastructure Access of $3,038.64/ML/day (in Central Goulburn), and 271ML would have been converted to a Delivery Share with Annual Delivery Allowance of 271ML/season which is 1.004ML/day*

Source: ABARE 2008, DPI region water costs (2008-09), GMW rates and charges 2008-09.

In drought conditions of 2006-07, reported farm incomes and profitability are low and increases in the fixed water supply charges would place further downward pressure on income and profitability.

Termin -ation	Increase in fixed water supply charges	Change in farm cash income		
		Murrumbidgee region – average broadacre farm	Murray – average broadacre farm	Goulburn–Broken – average dairy farm
6%	2.1%	–0.7%	–0.3%	–0.4%
15%	5.9%	–2.0%	–0.9%	–1.0%
30%	14.3%	–4.8%	–2.3%	–2.4%

Table 11: Change in drought incomes if fixed water supply charges increase

Compared to the average-normal conditions considered in the previous section, water availability in 2006-07 was very low — for example, Murrumbidgee allocations reached 10% and Goulburn allocations reached 29% — and water prices were also higher (figure 6).

[9] Farm business profit is the cash operating surplus plus buildup in trading stocks, less depreciation, less the imputed value of the owner manager, partner(s) and family labour.

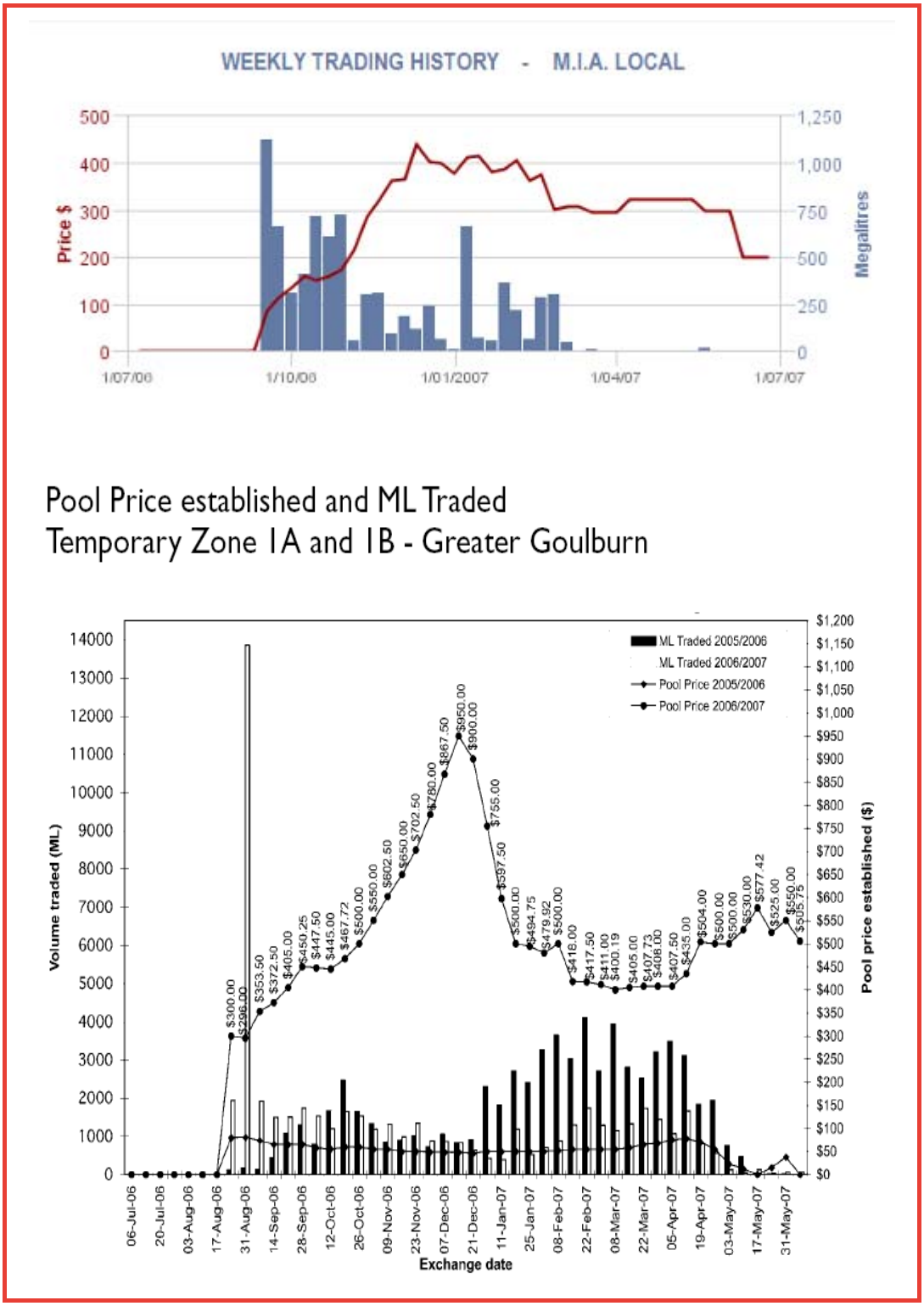

Figure 6: Selected water prices in 2006-07

Source: WaterExchange.com.au and GMW 2007.

SENSITIVITY OF RESULTS TO IIO CHARGING STRUCTURE

Currently, there is a range in the relative fixed and variable charges used by infrastructure operators in their charging structures. The above analysis was based on the reported fixed component of charges (in NSW DPI Water Cost estimates). However if the movement towards cost-reflective pricing leads to costs being reallocated between fixed and variable components then the results from the previous analysis will change.

For example, in 2007-08 Murray Valley Water Costs (as provided by NSW DPI farm budgets) has a fixed Water Supply Charge of $7.24/ML (per ML of entitlement) and a variable Water Usage cost of $9.35/ML (per ML of water delivered). Table 12 compares the sensitivity of the results from table 6, to alternative cases where all of these fees relate to fixed infrastructure costs.

	Selected Murray Valley Water Costs (2007-08)	Alternative #1	Alternative #2
Fixed charge	$7.24	$16.59	$11.92
Variable charge	$9.35	–	–
Total charge (per ML at 100% allocation)	$16.59	$16.59	$11.92
Total charge (per ML at 50% allocation)	$23.83	$33.18	$23.83
Termination	*Impact on farm profitability*		
6 per cent	-0.37%	-0.95%	-0.60%
15 per cent	-1.01%	-2.62%	-1.67%
30 per cent	-2.46%	-6.35%	-4.06%

Table 12: Sensitivity of Murray Rice results to charging structure

SENSITIVITY OF RESULTS TO THE UNDERLYING NPV

If the underlying NPV of future infrastructure costs is 20 times the access fee, under Schedule E rules of 15 times, termination will already have a given effect on the access fees faced by remaining irrigators. The rule change (to ACCC Draft rule of 10 times) would have an additional impact (table 13).

	Degree of termination		
	6%	*15%*	*30%*
Initial delivery share	100	100	100
Initial NPV of fixed costs	$1,000,000	$1,000,000	$1,000,000
Initial fixed costs per unit	$10,000	$10,000	$10,000
Initial access fee	$500	$500	$500
Remaining delivery share (%)	94%	85%	70%
Schedule E rule (15x)			
Termination fee paid	$45,000	$112,500	$225,000
Remaining NPV of fixed costs	$955,000	$887,500	$775,000
Remaining fixed costs per unit	$10,160	$10,441	$11,071
Remaining access fees	$508	$522	$554
Increase in access fees	1.6%	4.4%	10.7%
Draft ACCC rule (10x)			
Termination fee paid	$30,000	$75,000	$150,000
Remaining NPV of fixed costs	$970,000	$925,000	$850,000
Remaining fixed costs per unit	$10,319	$10,882	$12,143
Remaining access fees	$516	$544	$607
Increase in access fees	3.2%	8.8%	21.4%
Increase in access fees from rule change	*1.6%*	*4.2%*	*9.7%*

Table 13: Increases in access fees due to termination, if unavoidable costs are not reduced – based on an underlying NPV of 20 times

The rule change (from the Schedule E rules to the Draft ACCC rules) would result in fewer costs being met by terminating irrigators, a greater amount of costs being met by remaining irrigators and hence an increase in water supply fixed access fees. For example, if underlying NPV of future infrastructure costs is 20 times, if 15% of delivery share is terminated under Schedule E rules the estimated to change farm profitability on Murray rice by -0.76% (table 14) compared to 15% termination under draft ACCC rules when the estimated change to farm profitability on Murray rice by -1.52% (table 15). This means the rule change is estimated to change the farm profitability on Murray rice by -0.8% (table 16).

Crop	Change in fixed water charges	Change in total water charges	Change in total costs	Change in gross margin
	(%)	(%)	(%)	(%)
Murray rice				
6 per cent	1.6%	0.27%	0.14%	-0.28%
15 per cent	4.4%	0.74%	0.39%	-0.76%
30 per cent	10.7%	1.79%	0.94%	-1.85%
Murrumbidgee rice				
6 per cent	1.6%	0.28%	0.14%	-0.16%
15 per cent	4.4%	0.77%	0.38%	-0.45%
30 per cent	10.7%	1.87%	0.93%	-1.09%
Loddon hort. (grapes)				
6 per cent	1.6%	0.34%	0.02%	-0.10%
15 per cent	4.4%	0.95%	0.06%	-0.27%
30 per cent	10.7%	2.30%	0.15%	-0.65%

Table 14: Numerical example under Schedule E rules

Note: The above numerical example only varies the fixed water charges and keeps all other costs constant.

Crop	Change in fixed water charges	Change in total water charges	Change in total costs	Change in gross margin
	(%)	(%)	(%)	(%)
Murray rice				
6 per cent	3.2%	0.53%	0.28%	-0.55%
15 per cent	8.8%	1.47%	0.77%	-1.52%
30 per cent	21.4%	3.57%	1.88%	-3.70%
Murrumbidgee rice				
6 per cent	3.2%	0.56%	0.28%	-0.32%
15 per cent	8.8%	1.54%	0.77%	-0.90%
30 per cent	21.4%	3.74%	1.86%	-2.18%
Loddon hort. (grapes)				
6 per cent	3.2%	0.69%	0.04%	-0.19%
15 per cent	8.8%	1.90%	0.12%	-0.54%
30 per cent	21.4%	4.60%	0.30%	-1.30%

Table 15: Numerical example under ACCC draft rules

Note: The above numerical example only varies the fixed water charges and keeps all other costs constant.

Crop	Change in fixed water charges	Change in total water charges	Change in total costs	Change in gross margin
	(%)	(%)	(%)	(%)
Murray rice				
6 per cent	1.6%	0.3%	0.1%	-0.3%
15 per cent	4.4%	0.7%	0.4%	-0.8%
30 per cent	10.7%	1.8%	0.9%	-1.8%
Murrumbidgee rice				
6 per cent	1.6%	0.3%	0.1%	-0.2%
15 per cent	4.4%	0.8%	0.4%	-0.4%
30 per cent	10.7%	1.9%	0.9%	-1.1%
Loddon hort. (grapes)				
6 per cent	1.6%	0.3%	0.0%	-0.1%
15 per cent	4.4%	0.9%	0.1%	-0.3%
30 per cent	10.7%	2.3%	0.2%	-0.7%

Table 16: Numerical example of rule change effects

Note: The above numerical example only varies the fixed water charges and keeps all other costs constant.

SUMMARY

There have been concerns that setting the termination fee based on 10 times the infrastructure access fee will have a adverse impact on remaining irrigators compared with a multiple of 15 times. If the full extent of this difference is passed through to irrigators, this would result in increased fixed infrastructure access costs being paid by remaining irrigators if some irrigators terminate.

Under normal-average water availability conditions, however, these increases are unlikely to be sufficient to affect irrigators' production decisions in the short-run and have significantly less of an impact than changes in the market price (opportunity cost) of water, the on-farm price of the agricultural product or crop yield.

If the production decisions of remaining irrigators are not significantly altered, then their incentives to continue irrigating in the short-run and remain connected to irrigation infrastructure will be similarly unchanged.

In the longer run, high rates of termination may affect long-term profitability but decisions for subsequent irrigators to terminate will still be predominantly driven by other considerations, such as expected changes in the market price (opportunity cost) of water, the on-farm price of the agricultural product and crop yield.

Under dry conditions, increased fixed costs may affect farm incomes and profitability more greatly. Also, if the underlying NPV of future infrastructure costs is greater than 15 times — such that termination fees under Schedule E

already result in termination impacts on remaining irrigators — then proportional increases in fixed water supply costs will be greater for a given degree of termination (and impacts on farm incomes and profitability will also be greater).

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