TRACING EVIDENCE OF RATIONAL INVESTOR BEHAVIOUR IN WATER MARKETS - REVISITED

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Abstract

With the National Water Initiative in place the Council of Australian Governments are actively pursuing the commoditisation of water entitlements. This will result in all water entitlements being separated from land ownership, and new water registers being established with the same features as the Torrens Title system for land. It is expected that this development will encourage the development of more sophisticated instruments and derivative products for water entitlements, products that will enable both a more speculative investment and trade in water products, as well as allowing water users to better manage the uncertainty associated with supply.

Investors in real property make a capital investment hoping to derive a periodic cash-flow from rental and a capital gain after a reasonable holding period. Such an investment will yield a given return often expressed as an internal rate of return. In this paper we will deal with water entitlements in a similar manner. A water entitlement yields a seasonal allocation of water which can be use for irrigation or can be sold every year, just as a property can be leased. At the 2005 PRRES conference, we presented some initial analyses using this investment rationale, based on ten years of data from the Goulburn-Murray Irrigation District and some simple cash-flows (Bjornlund and Rossini, 2005). In this paper we extend these analyses with a longer time period of thirteen years and the use of more complex cash-flow analyses under different decision making scenarios as to when to sell the seasonal allocations. These scenarios include selling at the peak, trough and midpoint of the annual price cycle; selling water equally over the ten "water months"; selling water based on a naive forecast from the peak sales period in the previous year; and selling water during the six "high season" months based on seasonal indices. These analyses are used to assess returns that investors could have achieved through an investment in water entitlements. Long term cycle factor analyses are also discussed to determine the extent to which entitlement prices follow allocation prices over the longer term.

Initial results from discounted cash flow analysis indicate that the returns from investments in water entitlements have become more stable as the market matures and that the returns are more comparable to other similar investments. Initial results from cycle factor analyses indicate that the movement in prices of water entitlements and allocations are reasonably synchronized and that the price fluctuation of allocation prices is about twice that of water entitlements.

Keywords: Water entitlements, water trading, water investment, water value, discounted cash flow, time series analysis

1 Introduction

Many property trusts are combining portfolios of different property classes to diversify their investment and off-set risks associated fluctuating yields in any particular property class. Water entitlements are slowly emerging as a new class of property that might provide new opportunities for property trusts and other investment bodies including property as an integral part of their total portfolio. The use of water entitlements in this regard and the development and introduction of more innovative and derivative water products necessary to maximize the investment return from this class of assets has in the past been impeded by a number of factors such as: a) the link between land and water; b) the absence of clearly specified water entitlements; c) the lack of secure and transparent registers in which third party interest in the water entitlement can be registered and secured; and d) the level of uncertainty about the magnitude of the future stream of water allocations yielded by the water entitlement. Many of these impediments are presently being removed under the National Water Initiative (NWI). It could therefore be expected that the development of new water products might gain pace.

The NWI acknowledges that current water market arrangements are preventing water markets from reaching their full potential and emphasises the need to develop more efficiently working markets and more sophisticated and innovative market mechanisms and water products. Experiences from other markets indicate that the most significant efficiency gains are created through the introduction of markets in derivative products (ACIL, 2003). The NWI sees the need for these reforms in order to: a) better allow water users to manage risk associated with increased water scarcity; b) ensure that all water available for consumption is put to the most efficient and valuable use under any given supply and commodity market conditions; and c) minimize the socioeconomic impact of achieving environmental objectives.

It appears that policy makers now can see the advantages of the treatment of water entitlements as an investment vehicle and therefore are promoting the introduction of water products which will facilitate this process and are working to remove the current impediments to the introduction of such products. The foundation is therefore being created for the entry of investment bodies such as property trusts into water markets. However, many water users, especially irrigators, see the use of water as an investment object, or the entry of 'speculators' into water markets, as a danger to their own future and that of their communities (Bjornlund, 2004). In response, the Victoria White Paper suggests to cap the proportion of any given water source that can be owned by any one entity at 10%.

However, other developments, during a long period of severe drought from 1997 to 2006 and culminating with two seasons of exceptionally severe drought of 2002/03 and 2006/07, could suggest that the above attitude might change. As water scarcity intensifies and as high value users experience prices in the $500+/Ml range in the allocation market, they will start to look more seriously at alternative ways of securing their water supply. While the purchase of additional water entitlements may appear as a logical solution, it might not be the most viable or profitable. If such products were available, high value users might be better off buying some kind of risk sharing contract with lower value users, such as options or conditional leases, or buying access to intra-seasonal water storage enabling them to carry water over from one season to another (Zekri and Easter, 2005; Pulido-Velazquez et al., 2004).

Experiences during normal supply years indicate that low value users are willing to sell at much lower prices than during drought years. Irrigators with significant investments in irrigation infrastructure, plantings or dairy herds and milking equipment, highly dependent on secure water supply might therefore be better of if they could buy water during these seasons and store it for drought years. Or, be able to sign contracts with low value users during years of 'normal' allocation levels for the supply of water during droughts. During drought periods, experiences suggest that buyers get frantic to buy, and sellers pursue the highest possible price. As a consequence buyers spend too much time and effort, and suffer too much anxiety, to secure adequate water, during a period where they need all their time and wits to manage the drought. On the other hand low value users might be willing to sign a contingent contract against a low annual payment and a 'reasonable' price for their water when the contract is executed. This provides a secure cash flow during all years while they can continue their low value cropping activities or sell their allocation at the going rate. For buyers, it provides certainty of supply and the cost of supply during droughts and spreads out the cost of drought management.

Since many of these water products will be developed and traded in a speculative as well as a productive capacity, the development of them will depend on the profitability of investing in water rights as an investment asset. At this conference in 2005 we presented some initial analysis of the rational of using water entitlements as an investment vehicle based on ten years of data and some simple cash-flow analyses (Bjornlund and Rossini, 2005). In this paper we extend these analyses with a longer time period of 13 years and the use of more complex cash-flow analyses as well as testing the returns of such investments under different investment and cash-flow management scenarios.

2 Experiences from other markets

The market for transferable fishing quotas in New Zealand is probably the most appropriate comparison. In New Zealand fishermen own perpetual individual transferable quotas (ITQ) to a certain proportion of the total allowable catch (TAC) each year for each individual fish species harvested. The authority will announce the TAC for each species every year and an annual catch entitlement (ACE) yielded by each ITQ. Two markets in fisheries quotas therefore exist: a) the market for ITQs in which the right to receive ACEs in perpetuity is traded; and b) the market in which individual ACEs are traded (Kerr, 2004; Newell et al., 2002). This is very similar to the water market where the entitlement, which is the right to receive allocations in perpetuity are traded in one market while seasonal allocations are traded in a different market.

Kerr and Newell et al. analyzed fifteen years of market data and found that the market had been reasonably competitive with a number of participants similar to other markets such as the US SO_2 market, as well as the market for taxi licenses in the US, and that price dispersion decreased and the level of market uptake increased as markets matured, much at the same level as markets for other commodities. They also found that prices paid in both markets reflect economic fundamentals such as the export price of fish, cost of fishing, demand and supply for fishing quotas, and GDP growth rate. Finally they found that the relationship between ITQs and ACEs reflects a capitalization rate much in line with the general interest level in New Zealand during the period.

Experiences from the fishing quotas market would therefore suggest that a similar market for water entitlements should be equally efficient. However, water markets, compared to fishing quota markets, have a couple of unique features and differences. In the fishing quota market a separate market exists for each species. Differences in profitability of the catch are therefore reflected in different prices for the quotas for the different species, which reflects a considerable range in price from about NZ$700 per ton for jack mackerel to 40,000 per ton for rock lobster (Newell et al., 2002). Rock lobster fishermen and jack mackerel fishermen are therefore not competing for the same fishing quota. In water markets, on the other hand, all water within a certain region is traded in the same market regardless of the value of the commodity produced by that water; say from wine grapes to pastures for wool production, with a significant dispersion in gross margin per unit of water used. Also, it could be expected that the level of ACE for fisheries are more consistent than the level of seasonal allocations for water given its dependence on fluctuations in climate. Finally, supply and demand of water does not only depend on the level of seasonal allocations and commodity prices but also on the level of natural precipitation and evaporation. Therefore the pricing relationships in the water market are likely to be more complex that the pricing relationship in the fishing quota market.

Furthermore, other players such as city water authorities and industries could participate in water markets with a far higher willingness/ability to pay than irrigators. This impact has clearly been demonstrated in Colorado in the US; here Pearson and Michelsen (1994) found that return on water in agricultural production seems to explain part of the price fluctuation in water prices until 1975, when urban growth increased around major cities. From then on other economic indicators such as the number of housing starts, population growth and the price of other commodities seem to explain the variation in price. Also, Colby et al. (1993), when analyzing individual water transfers in New Mexico, found that when the purchaser was what she termed a high profile buyer (such as urban water authorities or major industries) then the price was considerably higher than when the buyer was an irrigator. Also, anecdotal market evidence in the US suggest that prices in an area might stay at a level that reflects agricultural use, until a major industry enters the market causing prices to go up considerably until that industry has satisfied its demand, at which time prices seem to settle back at more or less its previous level (Colby, 1987). In water markets in Australia there is so far no or little evidence of non-agricultural water users driving water markets. Close to 99% of water transfers are between agricultural users (Bjornlund, 1999).

Bjornlund (2002) analyzed individual transfers of water entitlements to establish the factors influencing individual irrigators' willingness to pay and accept prices in the market for entitlements over two time periods within two different states. He found that as trading was opened up both spatially and between different types of water users and classes of water entitlements, and as market operations became more proficient and intermediaries more active in the market, prices increased and became more consistent across space and entitlement classes. This is consistent with earlier findings in US markets (Gardner, 1985; Brown et al., 1982). He also found that: 1) efficient and higher valued irrigators were willing to pay higher prices when buying, and were capable of demanding higher prices when selling; 2) buyers and sellers in the strongest bargaining position paid lower prices and received higher prices; and 3) older farmers sold at lower prices unless they sold as part of a planned retirement process. Finally, he found that price dispersion in the market in South Australia declined sharply from 1987 to 1996, from about 18% from 1987 to 1992, to 12% from 1992 to 1995, and down to 6% from 1995 to 1996. On the other hand markets in Victoria had a constant dispersion during the first nine years of trading of about 20%. This however is still within the range of what is experienced for other commodities where a range between 5% and 30% is quite common (Pratt et al., 1979). These findings indicate that when individual farmers are bidding for water in the same market at any given time then normal economic factors seem to determine the outcome of the market process.

Bjornlund and Rossini (2004, 2006) analyzed mean monthly prices in the markets for allocations and entitlements respectively over a ten-year period. They found that prices in the two markets have increased significantly over the ten-year period with prices of allocations increasing by an annualized rate of 31.85%, while prices of entitlements increased at a more mundane rate of 15.08% pa. There was relatively little influence of commodity prices on prices paid in either market. There was a strong negative correlation, but no causal relationship, between dairy prices and the price of water in both markets. The price of feeding barley had a significant positive impact on the price of allocations; this reflects the fact that the dairy industry is the main buyer in the study region, and that these irrigators can substitute buying water to grow grass by buying feed. As the price of substitute feed goes up the farmers' willingness to pay for water to grow grass also goes up. The main factors influencing prices in both markets are the level of seasonal allocation and evaporation. As the level of seasonal allocation goes down, the price in both markets goes up. As evaporation increases the price of allocations goes up, which reflects an increased demand for irrigation water. In the market for water entitlements there is a strong relationship between the price of entitlements and the price of allocations as is the case in the property market and in the market for fishing quotas in New Zealand (Kerr, 2004). Finally the level of interest rate has a significant impact on price in both markets, as interest rates go down the price of water goes up.

Bjornlund and Rossini (2005) analysed allocation and entitlement prices during the 1993 to 2003 period. Based on cycle factor analyses and some basic cash flow analysis they concluded that there was a strong relationship between allocation and entitlement prices and that returns from investing in entitlements over a five year investment period fluctuated between 15% and 25% p.a. They found that the time series available were still short and that the cash flow analyses could be improved. The paper also highlights the need to further investigate how returns from the investment would vary depending on the investment strategy of the investor – these issues are addressed in the results section of this paper.

We can conclude that the water markets do not follow economic fundamentals to the same extent that the market for fishing quotas does, even thought there are some clear signs of this taking place. This is likely to be because of the impact of climatic fluctuations. The last six years of the ten-year study period were dominated by drought and very low seasonal allocations; markets have therefore been driven by 'protective' buying by high value users with significant investments in water dependent infrastructure such as permanent plantings, irrigation systems, milking herds, milking equipment etc. These irrigators are likely to suffer significant long-term losses if they do not irrigate. They are therefore willing to pay prices in excess of the productive value of water in order to protect their assets and stay in business for the next season. There is therefore little evidence during this period of opportunistic irrigators buying extra water because the prices of the commodities they are growing are good.

3 Data and methodology

The analyses in this paper are based on prices paid for water entitlements and allocations within the Goulburn System of the Gouburn-Murray Irrigation District from July 1993 to June 2006. Prices paid in the entitlement market from 1993 to 1996 were obtained from a survey (Bjornlund, 1999), and since 1996 from the records of Plan Right, one of the major water brokers within the district, as well as Goulburn-Murray Water and WaterMove. Prices in the allocation market from 1993 to 1998 were obtained from Plan Right and since 1998 from the Northern Victoria Water Exchange and WaterMove. Mean monthly allocation and entitlement prices were calculated to create monthly time series. Monthly time series were also established for the allocation levels and the volumetric water charges associated with holding the entitlement which is paid once a year in December.

The mean allocation and entitlement price series were first analysed using a simple ratio-to-moving average method (classical time series decomposition). This method is useful as it breaks the series into its components of trend, seasonality and cycle. Previous research by Bjornlund and Rossini (2005, 2006) shows that both series have a long-term upward trend and that rainfall affects the prices on a seasonal and cyclical basis. This approach is a simple way of investigating the link between fluctuations in allocation and entitlement prices. If allocation prices have a seasonal pattern this should be taken into account when an investor determines the most beneficial time to sell, and if entitlements prices have a cyclical pattern this should be taken into account when deciding when to buy and sell entitlements. This is similar to the approach used in other markets, e.g. the property market. The decomposition model is estimated using linear regression with an exponential transformation to estimate the trend component, with seasonal indices and cycle factors calculated by the ratio of twelve monthly centred moving averages. This provides a simple compounding growth rate as well as seasonal indices and a plot of smoothed cycle factors. Multiple regression, with an exponential trend line and dummy variables for each month, is then used to verify the results.

To estimate the return from investing in water entitlements, a discounted cash flow (DCF) approach has been used to compute the internal rate of return (IRR) over a five year investment period. The following assumptions and scenarios were tested:

1. The investment is purchased at the mean entitlement price for each month. This becomes time zero in each cash flow. A separate DCF calculation was made for each month of the time series as long as data is available for the 5 year investment period, resulting in 91 IRR estimates. This was repeated for each scenario.
2. The entitlement holder then sells the allocation each year. The 6 scenarios used assume that the investor sells as much allocation as possible during the month when the mean price;
    - is at a minimum for the year (constantly unlucky),
    - is mid-range (median, most likely),
    - is at a maximum (constantly lucky or very smart),
    - was at a maximum the previous year (naive forecast); and,

selling an even proportion of the entitlement each month over 10 months (a low risk strategy) and over the 6 months when prices are normally highest (high seasons).

3. In each instance the investor can only sell the amount that has been "allocated to that point". So for scenario 3, if the maximum price is in December, but at that point only a 50% allocation has been announced, then they would sell the 50% allocation at that price, any additional allocation made available due to increases in the allocation level will then be sold at the next highest price following the increase. In some instances this results in progressive sales over several months. It is assumed that the investor will attempt to maximise return by selling as much allocation as possible and this will occur each year during the 5 years investment period. For each sale a 3% commission is deducted (payable either to a broker or WaterMove).
4. In December of each year the entitlement holder pays the volumetric cost associated with holding the entitlement. This is a slightly simplified approach to a by now complex pricing structure but approximates the situation.
5. The investment is sold after 5 years at the mean entitlement price within a three month window according to the same scenarios as for the sale of the allocation (minimum, median, maximum and naïve entitlement price, with median being used for the even allocation scenarios) minus a 3% commission.
6. The IRR is calculated as the monthly rate and converted to an effective annual rate.

4 Results

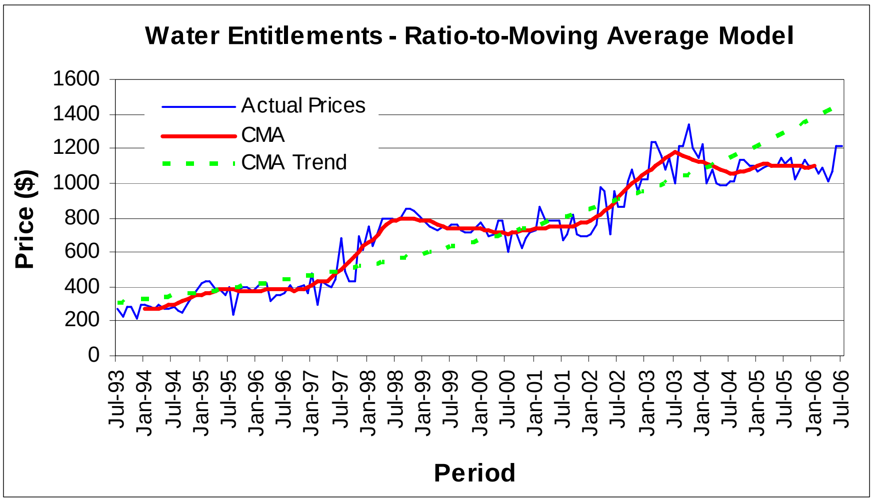

Figure 1: Entitlement prices, Ratio-to-moving average model

Monthly Growth	**1.0%**
Annual Growth	**12.7%**
Seasonal Indices	
Jan	1.048
Feb	1.009
Mar	1.047
Apr	1.004
May	0.970
Jun	0.992
Jul	0.987
Aug	0.950
Sep	0.984
Oct	0.993
Nov	1.020
Dec	0.995

Table 1: Implied average growth rates and seasonal indices

4.1 Trend and Seasonality

Prices of both entitlement and allocation have increased substantially over time. During the first 10 years entitlement prices increased by an average of 15.08% p.a. (Bjornlund and Rossini, 2006). As can be seen from Figure 1 the increase has since declined with actual prices dipping below the long term trend following the drought of 2002/03. Over the period 1993 to 2006, average annual growth has been 12.70%. While figure 1 indicates that entitlement prices as of 30 June 2006 is below the trend line, it should be noted that the unprecedented drought has caused entitlement prices to move back to this trend line by November 2006 and are now in excess of $1,500/Ml. Table 1 shows that the seasonal variability in entitlement prices is small and varies around 5% above and below the annual average price.

Allocation prices have a strong seasonal variation that differ from year to year depending on rainfall and evaporation, however, on average prices move from a low in May to July (about 40% below the yearly average) to a high between August and January where prices are 20-30% above the annual average, before they start to decline again (Table 2). This knowledge should guide a potential investor in water entitlements when it comes to timing the sale of the seasonal allocations. Growth in allocation prices also seems to have eased off, in figure 2 actual allocation prices since the drought of 2002/03 has been consistently below the trend line and the implied annual average growth rate over this period has been 18.7% p.a. (Table 2) against 31.85% p.a. from 1993 to 2000 (Bjornlund and Rossini, 2006). It should also here be noted that since August 2006 prices of allocation has again raised considerably in response to the record drought and were in November 2006 selling for $650/Ml with an allocation level of 23%.

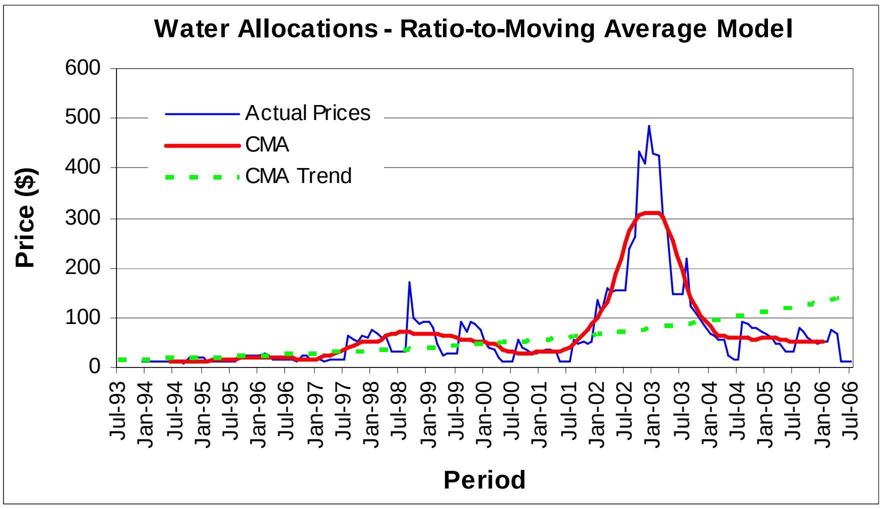

Figure 2: Allocation prices, Ratio-to-moving average model

Monthly Growth	1.4%
Annual Growth	18.7%
Seasonal Indices	
Jan	1.229
Feb	1.083
Mar	0.942
Apr	0.831
May	0.577
Jun	0.582
Jul	0.576
Aug	1.242
Sep	1.234
Oct	1.296
Nov	1.237
Dec	1.170

Table 2: Implied average growth rates and seasonal indices

4.1 The relationship between allocation and entitlement prices

As figure 3 shows the two price cycles are closely related; until about 1997 the entitlement price cycle seems to lead the allocation cycle, from 1997 to 2000 the two cycles seem synchronized, and since then the allocation price has been the leading indicator at a lag of around 6 months. It is also very apparent that the price of allocations fluctuates far more that the price of entitlements (note that the scales of the entitlement and allocation axis are significantly different but that a value of 1 is the point at which the cycle crosses long term trend lines). This suggests that since 2000 increased allocation prices have caused an increase in the willingness to pay for water entitlements. This is despite the fact that the stream of seasonal allocations yielded by the entitlement has declined and become increasingly uncertain, which, according to conventional financial wisdom, should result in lower willingness to pay for the entitlement. The magnitude of the cycle factor of allocation prices suggests that considerable opportunities should exist for mutually beneficial trade-offs between parties with different risk exposures using instruments such as options.

These findings suggest that the price relationship between allocation and entitlement prices now follows the same economic fundamentals as in property markets where rental levels determine property values. Also, the fact that allocation prices fluctuate so significantly indicates that derivative products might allow water users to take up risk positions in such markets, while allowing investors to repackage water products to maximize yields.

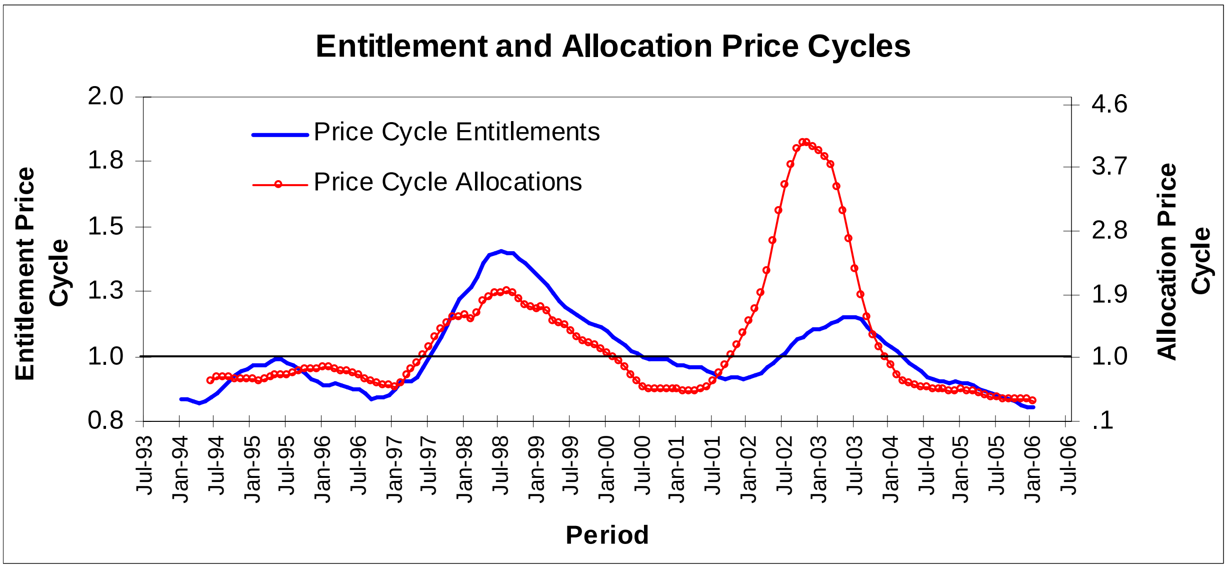

Figure 3: Price cycles for entitlement and allocation prices

4.2 Returns from investing in water entitlements

If parallels can be drawn from the property rental market and the equity market then the price of the underlying asset, in this instance the water entitlement, should be influenced by the income stream that can be expected from that asset. In the case of a rental property it is the rental of the property less the cost of holding on to the property as well as anticipated capital gain. In the case of shares it is the stream of dividends as well as anticipated capital gain. For a water entitlement it is the steam of seasonal allocations that the entitlement will yield. If the buyer is an irrigator, this allocation stream will result in an income stream from selling the products produced by using the water. If the buyer is an investor, then the stream of seasonal allocations will be converted into an income stream by selling the allocation at the best possible price each season. Previous research by Bjornlund and Rossini (2006) establish that in fact the allocation price was one of the main determinants of entitlement price during the ten year period from 1992 to 2003.

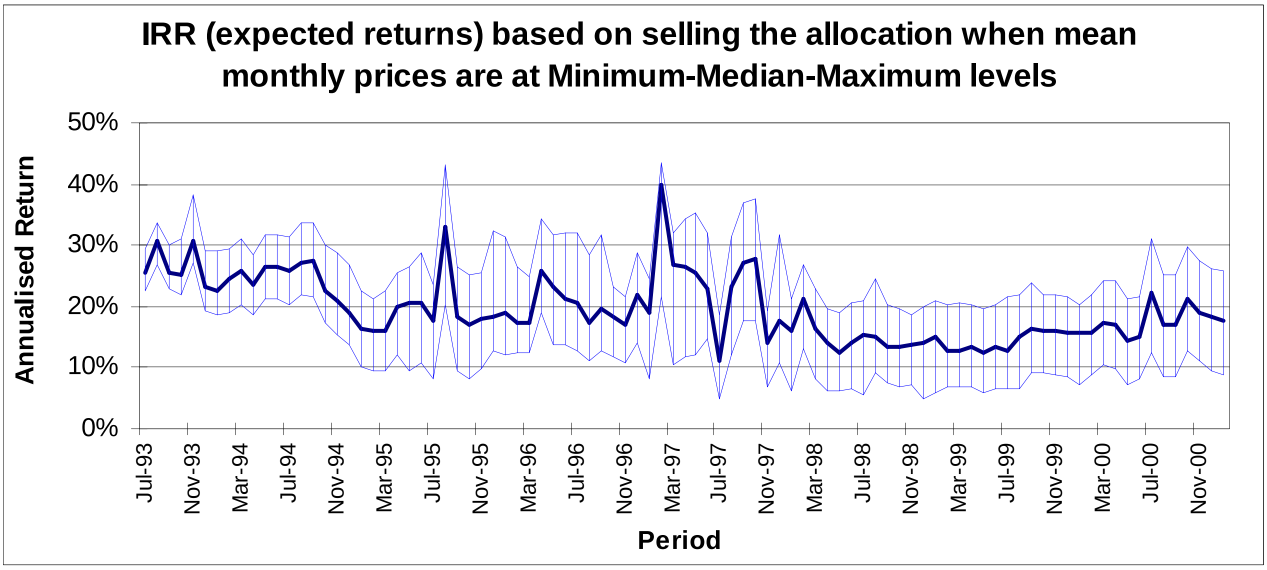

Figure 4: Range of expected returns from a 5 year entitlement investment

Figure 4 shows the returns that could have been achieved by an investment in a water entitlement if the initial investment was made at the going price, held for 5 years and then resold. The chart shows the range of outcomes that would have been achieved depending upon when the water allocation was sold. The heavy line indicates the most likely return, while the shaded area represents the extreme points, the returns that would have been archived if the investor sold at the maximum price each year, and the return that would have been achieved if sold at the minimum price. An investor purchasing an entitlement in the first few years would have received a return of around 25% per annum over the 5 years. Since allocation prices were stable the variation was small and even if sold at the minimum price the investor would have got a return of at least 20% p.a.

From 1995 to 1998 returns decreased to around 20%, as entitlement prices stabilized, and became more variable mainly due to fluctuating allocation prices following the introduction of the Exchange and the change to allocation policies after 1998. By the late 1990's the market seems to mature and the expected returns were steady at around 15% p.a. and variation was stable. Prices for allocations peaked in December 2002 with all allocation prices in the 2002-2003 season being high. This resulted in higher returns for investors if the 5 year investment periods spanned this season. As a result we see slightly higher returns of around 18% p.a. for investments made around 2000. The previous analyses assume ex-post knowledge. In practice the investor must take a risk in deciding when to sell the allocation so an ex-ante assumption should be considered. Three obvious decision strategies would be to: a) sell based on a naive forecast from the previous year; b) sell progressively over the ten trading months to spread the risk; or c) sell from August to January when seasonal indices suggest that allocation prices are highest. Results from these three strategies are shown in figure 5 and are compared to the results using the median outcome. The chart shows that an investment strategy involving equal sales across the season produce results very similar to the median and suggests that it is a low risk strategy. Using a naive forecast yields better returns in the early years but similar results during the latter periods. Using seasonal indices produced consistently superior yields from 1997 and similar yields to naive forecast prior to 1997.

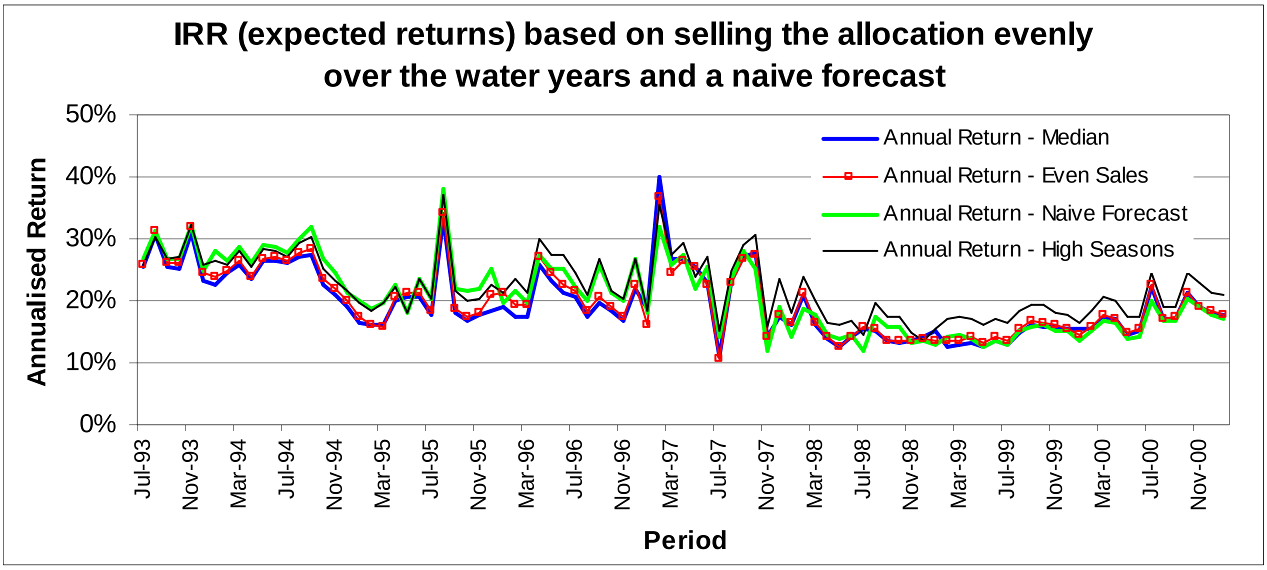

Figure 5: Expected returns from a 5 year entitlement investment under different scenarios

Capital gain appears to be the major contributor to overall return in a similar manner to the share market. Figure 6 breaks down the return into its capital gain and annual return components and confirms that most of the overall return is due to capital gain. However, over time the capital gain component has drastically declined while the return from the sale of water allocations has increased. Most of the variability in the overall return is due to fluctuations in capital gains while the return from the allocations is less variable, but growing. Where initial returns were based primarily on speculative capital gains more recent investments would return a more stable annual income. This reflects a maturing market and makes water entitlements a more appealing investment vehicle. Figure 4 also provides a comparison with the S&P/ASX 200 accumulated index. This indicates that returns from investments in water entitlements, while more variable, have exceeded those in the share market by about 5% p.a., since the market has matured. This probably reflects the increased risk associated with the long term yield of water entitlements under current policy conditions.

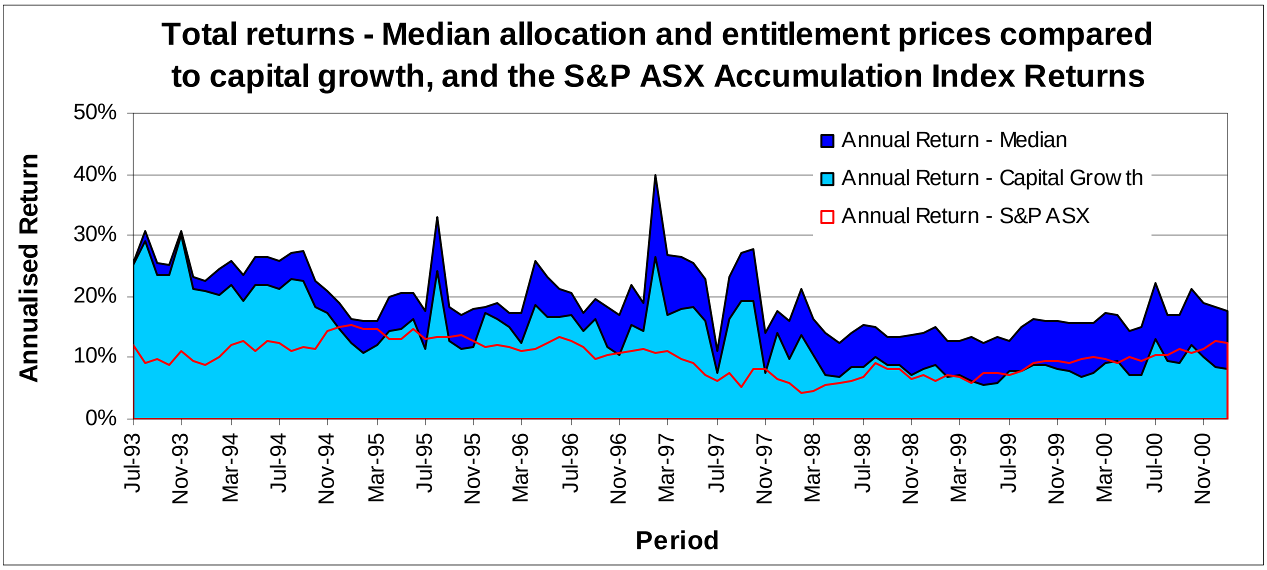

Figure 6: Annual return and capital growth components of entitlement investments

5 Conclusions

This paper analyses the viability of investing in water entitlements with the purpose of achieving a return on the investment over a five year holding period. This investment strategy is similar to the strategy pursued in the property and equity markets. Such analyses provide insight into the likely success of introducing markets in more innovative and derivative water products to provide water users with more flexible ways of managing their water supply, risk exposure and balancing their investments in different classes of operational and fixed assets.

The analyses indicate that the price paid for entitlements follows the price paid for allocations and that entitlement prices fluctuates significantly less than allocation prices suggesting reasonable rational buying decisions by entitlement buyers. The magnitude of the cycle factor of allocation prices suggests that considerable opportunities should exist for mutually beneficial trade-offs between parties with different risk exposures using instruments such as options. Cash-flow analyses suggest that the return on investment in water entitlements made during the period from July 1993 to December 2000 would have yielded returns in excess of most other investment options. Buyers entering the market during the first few years would have achieve a return of about 30% p.a. This return fell to around 20% p.a. for investments made from 1995 to 1997 and then stabilised around 15% p.a. over the following two years increasing to 20% for investments made toward the end of 2000. Initially most of the return was derived from capital gains; however, as markets matured and allocation prices increased, as a result of declining seasonal allocations, a larger and larger part of total return is derived from annual cash-flows associated with selling the allocations.

These analyses suggest that water entitlements should be a viable investment and that more elaborate repackaging of the water entitlement and its associated seasonal allocations could result in further gains. This should result in a more efficient allocation of water resources and ensure that water goes to the most profitable use during any given climatic and commodity market condition. It supports the emphasis that the National Water Initiative places on further developing the ideas of more innovative and sophisticated market products and mechanism and suggests to continue the reform process to create the foundation for such markets; that is: more secure and consistent water entitlements; better and more secure water registers; and a final solution to the initial allocation of water for the environment – providing better long-term security of the allocation stream yielded by the entitlement and thereby providing greater confidence in investing in the entitlements and trading in the products associated with such entitlements. It also suggests that it might be beneficial for the investment fraternity to start considering how to best utilize this new opportunity.

6 acknowledgements

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