Financial metrics for comparing Australian retirement villages

Timothy Kyng †* David Pitt † Sachi Purcal † Jinhui Zhang †

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Keywords Retirement Village Contracts; Life Insurance; Life Annuities; Real Estate Options; Financial metrics.

JEL classification D14, D81, G13, G22, J14, J26

* Corresponding author. Email: timothy.kyng@mq.edu.au

† Department of Actuarial Studies and Business Analytics, Macquarie Business School, Macquarie University, Sydney, NSW 2109, Australia.

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Retirement village contracts are complex, blending together financial options on real estate, life annuities, and life insurance. We analyse the structure of the cash flows involved in a retirement village contract and distill the cost components into an equivalent monthly comparison rent. In general, we observe lower monthly rents when the maintenance fees and deferred management fees are lower, when higher rates of capital gain are evident, and, importantly, when retirees reside in the retirement village for a longer period. Our analysis provides a framework to meaningfully compare the relative merits of the finances incorporated into retirement village contracts.

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1 Introduction

The ageing of the Australian population (Australian Bureau of Statistics 2015) has seen rising interest in a particularly Australian approach to retirement living, the retirement village (RV) (Stimson and McCrea, 2004; National Seniors Productive Ageing Centre 2013; Crisp et al., 2013). Financial decisions about living arrangements during retirement are complicated, with the need to compare alternatives. This paper aims to reduce these difficulties by developing an easily

understood metric, an equivalent monthly rent, which encapsulates the costs of living in a RV.

RVs are purpose-built residential complexes, where retirees of a similar age can live together (Hu et al., 2017). Initially, after World War II, RVs were mainly run by church groups and other charities in order to offer affordable accommodation to older people. This has changed dramatically in recent decades as investors realised the business opportunities which RV investment represents. This has led to a rise in the number of RVs by 8.5% between 2007 and 2010 (Mihm, 2018). Across Australia, 89% of the RV apartments on offer were occupied in 2017 (PwC, 2019).

RVs are designed for the healthy aged, and are not appropriate for retirees needing a higher level of care (Mihm, 2018). Depending on their RV contract, retirees who are no longer able to perform specified activities of daily living must leave the RV. Although some RVs have an associated aged care facility, access to these institutions is not guaranteed for residents of the RV. Entering these facilities depends on a separate contract, meaning that the customers have to end their contract with the RV and enter a new one with the care facility (Consumer Affairs Victoria, 2018).

RV contracts have a complex financial structure and many retirees make the decision to enter a RV at older ages. Australians aged over 70 years show significantly lower financial literacy than the average (Lusardi et al., 2014); in particular, females of this age group are the least financially educated subgroup (ANZ, 2008). Yet a survey conducted by Citi Australia found more than 60% of the respondents aged over 55 years perceive themselves to be above average in terms of understanding financial products (Citi Australia, 2010).

Recent media attention has highlighted the dissatisfaction of some RV residents with their choices (Ferguson, 2017, June 26) and several class actions against RV providers have also been launched (Levitt and Meyerowitz-Katz, 2018). Community concerns over the actions of some RV operators have spurred Victorian and NSW state government investigations of the sector (Parliament of Victoria, 2017; NSW Fair Trading, 2017).

To help consumers make informed decisions about their retirement living

choices, we consider the move to a RV through a financial lens and develop a financial metric based on the familiar concept of monthly rent.

This paper is organised as follows. In Section 2 we discuss the existing literature relevant to the topic of RV living, RV contracts, and the financial literacy of RV consumers. In Section 3 we consider legal and regulatory issues and the forms of ownership/tenancy rights of RV residents and the payment structures inherent in these RV contracts. We also discuss some of the risks inherent in the RV contracts from a consumer perspective. In Section 4, we discuss the equivalent monthly rent metric and present data and modelling of survival, death, and disability in the RV population. In Section 4 we also develop a financial model of RV contracts and show that the RV contract can be thought of as a combination of a life interest and complex insurance and financial products. We present the methodology for the valuation of the component parts of the RV contract along with the financial and demographic metrics relevant to understanding and making decisions about RV residency. This includes our proposed equivalent rent metric. In Section 5, we use the model and the metrics to analyse a range of actual and hypothetical RV contracts to illustrate the impact of different valuation assumptions on the metrics. In Section 6, we highlight the main risks involved for consumers. In Section 7, we present our conclusions and recommendations and highlight the main risks involved for consumers.

2 Literature

Hu et al.(2017) provides a recent review of the Australian literature on RVs, but to the best of the authors' knowledge, there is no research examining the quantitative financial nature of RV contracts. Broadly, papers typically focus on describing the non-financial characteristics of retirement villages or their residents, investigating either the reasons why retirees decide to enter a RV or aiming to inform consumers.

RV contracts involve a complex valuation mix of financial options (Black and Scholes, 1973); in particular options based on real estate (Fabozzi et al., 2012), together with life insurance and annuity products (Bowers, 1986; Haberman and Pitacco, 2018). In moving towards a quantitative analysis of RVs we note the

approach of researchers towards the problem of valuing executive stock options and variable annuities Brown and Szimayer (2008) and Kyng et al. (2016) value complex financial arrangements, where the payments are triggered by a stochastic process governing departure; RV valuation involves similar ideas relating to the valuation of the capital gain sharing.

Our goal is to produce a readily understood metric for consumers. This problem has already been tackled in the life annuities area, with researchers calculating money's worth ratios for prospective annuitants, reducing the often multi-faceted nature of annuity contracts into a single number (Doyle et al., 2004). Governments, too, calculate imputed rents for their national accounts on an ongoing basis (Poterba, 1992), but their calculations, based on applying average rental yields to average property values, are too broad, and fail to capture the significant differences existing between the terms of the many different RV contracts existing today. Throughout Australia, providers of home loan finance are required by law to quote a "comparison interest rate" for all of their home loans to assist consumers with comparison shopping. This comparison rate takes account of the interest rates charged and various other fees that may be part of the credit contract. We propose a rent metric to provide an analogous comparison metric in the RV context.

3 Contract Design and Cashflow Structure

3.1 Payments

Regulation varies across Australian states and territories, and residents' rights vary with the type of contract held. State governments lightly regulate retirement villages in a non-uniform manner and consumer protection is weak. By contrast, residential aged care is heavily regulated and subsidised by the federal government. There are a wide range of payment structures, which vary not only across RVs but also within a single village, due to changes in demand, competition, and economic conditions over time (Social Policy Research Centre, 2010). Moreover, the payment structure is substantially more complex than buying or

renting an apartment. Generally, the financial structure can be divided into three chronological phases:

- Payment before entering the village: entry fee (EF).
- Payment during residency: maintenance fee (MF).
- Payment after leaving the village: refund of the entry fee, less a deferred management fee (DMF). An (optional) share of the capital gain (CG) may be added.

The most common legal structures for RVs are leasehold (60%), loan/license (24%) and freehold/strata title (12%). These make up 96% of the village type/tenure arrangements (PwC, 2019). Under these structures residents pay an entry fee in the form of a lump sum before occupying the apartment. Additionally, a maintenance fee is usually payable weekly or monthly during residency.

INSERT FIGURE 1 HERE

From a financial perspective, the right to reside in the village conferred by the contract is analogous to a 'life interest in a property'. A life interest (also called life tenancy) is the right to reside in the property that lasts for the beneficiary's life. Likewise, the payment of the RV entry fee gives the resident the right to reside in the RV apartment. This right terminates when the resident dies, becomes incapable of living independently, or decides to move to some other accommodation.

3.1.1 Entry Fee

The entry fee, also called the premium or ingoing contribution in some jurisdictions, confers the right to live in the RV and the right to receive the exit payment(s). Most residents finance this payment by selling their family home (Social Policy Research Centre, 2010). The average entry fee for a two bed-room independent-living unit was $459,000 in 2019, but there is considerable variation in this fee (PwC, 2019). There are huge differences between villages depending on factors such as: location (especially access to medical services and transport), the age of the village, the reputation of the operator, and the standard of facilities or provided services (Social Policy Research Centre, 2010). Generally, the entry fee can be as high as the median house price in the same postcode or higher in some cases. Entry fees in excess of $1m in Sydney are not uncommon. The ratio of the average entry fee for an independent living unit (ILU) to the median house price in the same postcode is 45% for Sydney Metro, 74% for the rest of NSW, 79% in Canberra, 58% in Melbourne Metro, 78% in the rest of Victoria, and for Australia overall the ratio is 64% (PwC, 2019). This indicates the affordability of the entry fee relative to the value of a house, however this is not a fully valid comparison given that RV tenure is not the same as ownership. If the RV is less than 10 years old, its value can sometimes even exceed the median house price in the respective

area (Mihm, 2018).

3.1.2 Maintenance Fee

The average maintenance fee in Australia in 2019 was $536 per month (PwC, 2019). Similar to the entry fee, there is wide variation in this fee. The maintenance fee is intended to cover the cost for general services, any necessary maintenance, as well as management and staff costs (Consumer Affairs Victoria, 2018). It is not intended for generating surpluses. In NSW for example, it is not permissible to use maintenance fees to make good of any deficit (Retirement Villages Act 1999 (NSW) No 81 2019). However, in some states (e.g., SA, VIC, and WA) an operator is permitted to demand a special levy once in 12 months to cover additional expenditures.

Another source of additional cost for a resident is possible increases in the maintenance fee. In New South Wales the government approves a variation either by a fixed formula in specified intervals or a flexible increase not more than once per year. Increases, which exceed the growth of the Consumer Price Index (CPI), can only come into effect if the residents agree or they are imposed by a tribunal. In other states such as South Australia, an increase in maintenance fees is not regulated at all. The operator merely has to show in the annual meeting that the increase is "reasonable in view of the accounts for the previous year" (Retirement Villages Act 2016 (SA) 2019, s. 34(7)).

In addition to the special levies and the possible increase in maintenance fees, the uncertainty in the term of residency complicates the residents' financial planning. Whereas in NSW and in the ACT the payment of the maintenance fee is limited to 42 days after vacating the apartment, former residents in Queensland must continue to pay components of the maintenance fee for up to 9 months. According to the Retirement Villages Act 1999 (QLD) (2019), the operator is allowed to charge the full amount for up to 90 days after leaving the village and afterwards in accordance with the share of capital gain (Retirement Villages Act 1999 (QLD) 2019, s. 104). Regulation concerning the termination of the payment varies from state to state, fostering uncertainty amongst retirees.

3.1.3 Refund

Under both leasehold and loan/license arrangements, an operator is required to refund the entry fee less any fees. Most states require that the refund of the entry fee be paid within a certain time. The regulation varies from state to state and may vary with type of contract. For example, in New South Wales the refund is payable within 6 months or 12 months depending on type of contract and location. Considering the size of the refund, this is a long period and may financially disadvantage the consumer.

3.1.4 Deferred Management Fee

Most RV contracts deduct various fees from the refund paid to a departing resident. One such fee is called the "deferred management fee" (DMF). It may also be called the "exit fee", the "deferred fee" or the "non refundable portion of the entry fee". Another similar fee is called a "capital maintenance fee". The DMF is commonly expressed as an annual percentage of either the entry fee or the resale value (Consumer Affairs Victoria, 2018). Most RVs have an upper limit to the DMF percentage charged (McCullagh, 2014). PwC (2019) notes most RVs charge a DMF of some percentage of either the entry fee or of the resale value of the unit. 96% of RVs in the PWC report have an upper limit not exceeding 36% and 58% have an upper limit not exceeding 30%. The upper limit is reached by 6 years of tenure in 54% of cases and by 10 years of tenure in 99% of cases. Although the DMF formula will be specified in the contract, an exact calculation of the fee in advance is impossible because of the dependence on the unknown tenure and on the unknown resale value. Since the departure fee typically totals approximately 25% to 35% of the entry fee, it amounts to a crucial sum (McCullagh, 2014). This can lead to errors or misinterpretations of the true financial context by consumers (Social Policy Research Centre, 2010).

3.1.5 Capital Gain or loss

In some RV contracts a resident may be entitled to receive some specified percentage of the capital gain and/or be obligated to pay some specified percentage of the capital loss (McCullagh, 2013). Capital gain or loss is defined as the difference between the entry fee paid by a new resident and the entry fee paid by the departing resident. However, if a resident signed a contract before major changes took place in 2006, many contracts include a clause that allows the operator to withhold the money from any sale including the interest for up to eight years (Strong, 2012). If a contract assigns the complete capital gain to the operator, the retiree may end up with less money on leaving than entering the village because of the deferred management fee (Consumer Affairs Victoria, 2018). In Section 6 we show this may also be true even if the residents do share in the capital gain. As a result, the deferred management fee "can impose a financial burden on residents that effectively imprisons them in the village" (Social Policy Research Centre, 2010).

Moreover, poor financial management by the RV operator can degrade the security of a resident's capital. The amount of the capital gain depends on the resale value of the unit. Mismanagement might negatively influence the value and saleability of the RV apartments and consequently delay or decrease the repayment. If the apartment is not left in the expected condition, the operator may be allowed to transfer the cost for renovations to the departing resident (see Retirement Villages Act 1999 (NSW) No 81 2019, para. 163(5)). This may vary with type of contract and jurisdiction.

INSERT FIGURE 2 HERE

3.2 Demographics

The development of an equivalent rent (ER) metric needs to consider not only the time value of cash flows, but also the likelihood of those cash flows arising from the random time of departure from residency due to death or disability. The ER will vary with age, gender, and partnership status, as all these impact on a resident's survival function. Its calculation is complex to explain to consumers.

In the following we only consider involuntary exit due to disability or death as reasons for contract termination; voluntary exit is not considered.

Based on the survival functions described in Section 5.1 and estimated as explained in Appendix A, we can determine not only the expected time to death but also the expected time to exit from the RV population. For instance, for females aged 75 the expected term of residence is 13.3, 9.7, 8.7, 7.7 and 6.3 years for survival functions 5, 4, 3, 2 and 1[1], respectively. The expected time to death is 13.3 years, but the expected time to exit due to any type of disability or death is 6.3 years, using the transition matrix data described in Appendix A. Figure 2 shows two different survival functions for females aged 60 and males aged 75 computed from the transition matrix data. There is no publicly available demographic analysis of the RV residents' population in Australia, which we could use to model mortality and morbidity for survival modelling for the purposes of this paper. However, Hariyanto and Pitt (2014) developed an estimation method and transition matrices from ABS data and intended it to be applied to the pricing

[1] Refer to Section 5.1 and Appendix A

of reverse mortgage products in Australia. This data is ideally suited to the survival modelling needed for this analysis.

4 Methodology

4.1 Notation and Assumptions

We define $P_H(x, y)$ to be a survival function for integer x and fractional y values. This function represents the probability of survival from age x for term y. The subscript H indicates the type of healthy survival used in calculating this probability as explained in section 5.1. Using Hariyanto et al. (2014) and Hariyanto and Pitt (2014) we can obtain $P_H(x, y)$ that is tabulated for integer values of x, y such that $60 \leq x \leq 100,\ 0 \leq y \leq 100 - x$. From this, we assume that fractional y has values of the form $y = j/12, 0 \leq j \leq N$ and use log-linear interpolation to obtain $P_H(x, y)$. This allows us to estimate a projected monthly cash flow.

Recall the structure of the contract cashflows, outlined in Section 3.1 and represented in Figure 1. We may regard the refund of the entry fee less the deferred management charge as a type of insurance policy. It is similar to a death and disablement insurance policy but with a different definition of disablement to that used in most disability insurance policies. The amount and the timing of the refund less the deferred management fee depend on the timing of the resident's exit from the retirement village. This shows the insurance nature of the contract. We may regard the payment to the resident of their share of the capital gain at the time of exit from the RV as a type of call option contract, albeit one where the payoff is made at the time of exit (death/disability). We therefore have a hybrid of an insurance product, an option contract, and a long-term rental arrangement. Using a combination of life insurance and option pricing mathematics we can provide a valuation of this component of the payoff received by the RV resident.

We proceed using the following notation and assumptions.

- i is the effective annual valuation interest rate.
- g is the effective annual inflation rate.

– r is the real effective annual rate of interest.

– r_F is the continuously compounded risk-free annual interest rate.

– σ is the volatility of the resale price of the unit.

– x is the age at entry to the RV.

– $n = (100 - x)$ is time remaining in years until the resident attains age 100.

– $N = 12n$ is time remaining in months until the resident attains age 100.

– $S_x(y) = \frac{P_H(x,y)}{P_H(x,0)}$ is a survival function for a person who joined the RV at age x. This is defined for $0 \leq y \leq 100 - x$ and is the probability of survival y years beyond age x.

– $j \in \{0, 1, \ldots, N\}$ is the time index for the jth cash flow, occurring at time $T_j = j/12$ (years since inception).

– MF_j is the maintenance fee per month in month j of residency in the RV and we assume that MF_1 is specified in the RV contract and that $MF_j = MF_1 \times (1 + g)^{T_{j-1}}$ for $j \geq 1$ so that the maintenance fee grows at the inflation rate. It is paid at time T_{j-1} the start of the month j.

– EF is the entry fee paid by the resident for the right to live in the RV and to receive the associated cash flows that are part of the contract.

– X_{T_j} is the resale value of the right to live in the RV at time $T_j = j/12$ and we assume that $X_{T_j} = EF(1 + g)^{T_j}$ rate so that the resale price grows at the inflation. Note that $X_{T_0} = EF$.

– DMF(T_j) is the deferred management fee, deducted from the refund of the entry fee paid at time T_j if exit were to occur at that time. For example if a RV contract has a DMF of 6% of the entry fee for each year of residency limited to a maximum of 5 years we have DMF$(T_j) = EF \times \min\{5, T_j\} \times 0.06$. If the DMF rules were the same but were based on the resale value of the unit instead then we have DMF$(T_j) = X_{T_j} \times \min\{5, T_j\} \times 0.06$.

- α is the share of the capital gain from resale of the unit that the resident may receive at the time of exit from the RV. Typical values of α are 0%, 50% and 100%.
- $CG(T_j) = \max\{X_{T_j} - EF, 0\}$ is the capital gain on resale of the unit which would occur if the unit is resold at time T_j.
- $D(T_j) = S_x(T_{j-1}) - S_x(T_j)$ is the probability of exit from the RV due to death or disablement, between time T_{j-1} and T_j time for each person who joined the RV at age x at time $T_0 = 0$. We note that $\sum_{j=1}^{N} D(T_j) = 1$ and that $D(T_j) \geq 0, j \in \{1, \ldots, N\}$.
- $\bar{a}(x) = \frac{1}{2} + \left(\sum_{j=1}^{N} S_x(T_j)(1+r)^{-T_j}\right)$ is, being the value of an income stream payable during the customer's residency in the RV, where the payment stream is \$1 in the first month and $(1+g)_{j-1}^{T}$ during the period (T_{j-1}, T_j) and assumed payable at time $(T_{j-1} + T_j)/2$.
- $\bar{e}(x) = \frac{1}{2} + \left(\sum_{j=1}^{N} S_x(T_j)\right)$ is the expected term of residency in the RV.

4.2 Insurance Benefits

The economic value to the new entrant aged x of the refund of the entry fee can be thought of as a death and disability insurance policy with a constant sum insured, payable by the RV to the resident at the time of exit from the RV population. The economic value of this insurance is well approximated by the expression $A(x)$. This assumes no inflation adjustment in the refund.

$$A(x) = EF\left(\sum_{j=1}^{N} D(T_j)(1+i)^{-T_j}\right).$$

Likewise, the economic value of the deferred management fee the departing resident must pay to the RV can also be thought of as a death and disability insurance policy, but with a non-constant sum insured, payable by the resident to the RV at the time of exit from the RV population.

The value of this insurance is approximately

$$V_{DMF}(x) = \sum_{j=1}^{N} DMF(T_j) D(T_j) (1+i)^{-T_j}.$$

Combining these two insurance benefits, the approximate value of this insurance is

$$V_{INS}(x) = \sum_{j=1}^{N} \left(X_{T_0} - DMF(T_j) \right) D(T_j) (1+i)^{-T_j}.$$

4.3 Capital Gain

The capital gain on resale of the RV unit in the period (T_{j-1}, T_j) is $CG(T_j) = \max(X_{T_j} - X_{T_0}, 0)$, and this can be thought of as the payoff on an at-the-money call option maturing at time T_j. The time of exit is random and the probability of exit during the period (T_{j-1}, T_j) is $D(T_j)$. We assume that the time of exit is statistically independent of the resale value of the unit, and that the assumptions of Black and Scholes (1973) apply to the resale value. As Van Bragt et al. (2015) have shown, more sophisticated approaches are possible in dealing with real estate derivatives, but we leave these to further research. Statistical dependence among mortality rates, asset values, and interest rates and more general assumptions than those of Black-Scholes are considered in Fergusson (2020).

Under our assumptions, we can provide an expression for the value of the capital gain payable at the time of exit from the RV:

$$V_{CG}(x) = \left(\sum_{j=1}^{N} C(X_0, K, r, y, \sigma, T_j) D(T_j) \right)$$

where $C(X, K, r, y, \sigma, T)$ is the Black-Scholes value of a call option over an asset with spot price X, strike price K (usually, we can define $K = EF$.), maturity T_j assuming a risk free rate of r_f, a dividend yield of y, and a volatility of σ. A similar expression applies to the value of any capital loss the resident may have to pay. We have assumed in our results that the contract does not have capital loss sharing. This treats the capital gain as a portfolio of at-the-money call options with different maturity dates and where the number of units of the call options are given by the exit probabilities. This approach requires estimation of the parameters r_f,

y and σ. We set $y = 0$ as the apartment cannot be rented out.

3. 4.4 Equivalent Rent Metric

The life interest can be thought of as an indexed annuity of the equivalent monthly rent (ER) that a resident would pay for the rest of their residency. Hence, it follows that

$$V_{LI} = ER \times \bar{a}$$

and

$$ER = MF_1 + \frac{EF - V_{INS}(x) - \alpha V_{CG}(x)}{\bar{a}(x)}$$

This ER term is the monthly rent payable on a residence where the landlord pays for the maintenance of the facilities and infrastructure. The term

$$\frac{EF - V_{INS}(x) - \alpha V_{CG}(x)}{\bar{a}(x)}$$

can be thought of as the monthly equivalent rent on the apartment excluding the maintenance fee (MF) which is payable separately. The maintenance fee is supposed to be payable for the purpose of maintaining the facilities of the RV but not for contributing to the profits of the RV. However, to the resident this still represents a cost and this should be included in the rent metric to make it useful for comparison shopping. The economic value of the maintenance fee is the product of the initial monthly maintenance fee and the indexed annuity factor,

$$V_{MF} = MF_1 \bar{a}(x) .$$

4. Other Metrics

We now consider some other relevant metrics. The maintenance fee is payable during the residency and failure to pay it can result in termination of residency. The value of the insurance benefit (refund of entry fee less the DMF) is denoted by V_{INS}. The value of the capital gains share payable is denoted V_{CG}. The value of the right to reside in the RV is denoted by V_{LI}. We express each of these items as a percentage of the entry fee and these are additional metrics of interest. The metrics are

$\frac{V_{INS}}{EF}$ measuring how much of the entry fee pays for the insurance benefit

$\frac{V_{CG}}{EF}$ measuring how much of the entry fee pays for the capital gain share

$\frac{V_{LI}}{EF}$ measuring how much of the entry fee pays for the right to reside in the RV

$\frac{V_{MF}}{EF}$ measuring how much the maintenance fees are worth relative to the entry fee

The relationship between these ratios is

$$\frac{V_{INS}}{EF} + \alpha\frac{V_{CG}}{EF} + \frac{V_{LI}}{EF} = 1 + \frac{V_{MF}}{EF}.$$

It follows that

$$\frac{V_{LI}}{EF} = 1 + \frac{V_{MF}}{EF} - \frac{V_{INS}}{EF} - \alpha\frac{V_{CG}}{EF},$$

and the equivalent rent per month satisfies the equation

$$ER = \frac{V_{LI}}{\bar{a}(x)} = \frac{EF}{\bar{a}(x)}\left(1 + \frac{V_{MF}}{EF} - \frac{V_{INS}}{EF} - \alpha\frac{V_{CG}}{EF}\right)$$

where $\bar{a}(x)$ is the value of an indexed annuity, payable monthly, for the rest of the healthy lifespan of a person aged x at entry to the RV, and who experiences the assumed survival function.

From this equation we see that the equivalent rent will decrease if the value of the insurance or the value of the share of capital gain increases.

5 Results

5.1 Assumptions

To illustrate the ER and other metrics, we compute these metrics for RV contracts using the hypothetical base case financial assumptions in Table 1. We illustrate many features of the contracts via these hypothetical calculations including the sensitivity to changes in the assumptions.

Using the alternative definitions of survival in the framework of a RV, we can obtain different survival functions for determining the end of residency.

INSERT TABLE 1 HERE

- Survival Function 1: death or any disability results in termination of the residency
- Survival Function 2: death, moderate, profound or severe disability (Top 3 most severe disabilities)
- Survival Function 3: death, profound or severe disability (Top 2 most severe disabilities)
- Survival Function 4: death or profound disability (the most severe disability)
- Survival Function 5: death only (life table rates)

We have assumed that the resale price (X_{T_j} at time T_j) of the RV unit grows at the CPI inflation rate g.

Table 2 provides illustrative data for a sample of the RV contracts used in our modelling.

INSERT TABLE 2 HERE

We assume here a female new entrant, aged 75, and we use Survival Function 3. In Table 3, for the scenarios labelled (a) the DMF is assumed to apply to the resale price (X_{T_j}) whereas in the scenarios labelled (b) the DMF is assumed to apply to the entry fee (EF), as described in the previous section.

INSERT TABLE 3 HERE

5.2 Analysis

The monthly ER is higher when the DMF is applied to the resale value than when it applies to the entry fee. This is due to the fact that we have assumed a positive inflation rate for the resale value.

In all scenarios, except scenario 1, the value of the insurance benefit is a substantial proportion of the entry fee paid (being close to 50% of the entry fee). The value of the insurance benefit combined with the value of the capital gains share is higher still as a proportion of the entry fee. This means that the consumer is spending a large part of the cost of buying into the RV on a complex insurance product and a complex financial product.

The value of the life interest (right to reside in the RV) is a substantial proportion (over 50%) of the entry fee except for those scenarios where the consumer is entitled to a share of the capital gain, where it is lower. However, the entry fee is only one component of the price of buying the right to live in the RV and to receive the RV contract payments. The economic value of the maintenance fees is the other component of the price paid. If we express the value of the life interest as a proportion of the entry fee combined with the economic value of the maintenance fees to be paid, the value of the life interest is a smaller proportion of that total cost.

5.3 Sensitivity and Scenario Analyses of the Model

5.3.1 Sensitivity to the Demographic Parameters

Next we explore the effect on the metrics of age, gender, and the survival function used. We illustrate this for a hypothetical RV with the contractual features specified in Table 4.

INSERT TABLE 4 HERE

The following scenarios for age, gender, and survival functions show how the metrics vary with these factors. Table 5 provides the results for the survival

functions calculated based on the transition matrix approach[2].

For both genders we see that the equivalent rent metric increases with the age of the new entrant, indicating that the RV contract is better value for younger consumers than older consumers in terms of the equivalent rent. The results appear to be better for females than for males. We also see that the results are better for Survival Function 5 (which assumes that residents can stay in the RV until they die) than for Survival Function 3 (which assumes that death or severe or profound disability results in termination of the residency).
Generally the longer the expected term of residency, the lower the equivalent rent metric. The results show a pattern of cheaper equivalent rent for younger ages. The equivalent monthly rent is about $500 lower for a new entrant aged 70 than one aged 80.

INSERT TABLE 5 HERE

Next we consider the effect on the metrics of the survival function used. Here we are investigating how the level of severity of disability that triggers exit from the RV impacts on the metrics. We perform this calculation for a new entrant aged 75 to a hypothetical RV with the same features as in Table 4. Scenarios and metrics for changes to the assumed survival function are presented in Table 6.

INSERT TABLE 6 HERE

The strictness of the policy regarding termination of residency due to disability is dealt with in our model via the different survival functions. After specifying the

[2] Refer to Appendix A

age and gender of the consumer, we have five different possible survival functions reflecting the severity of the policy. As the RV's policy of terminating the residency of disabled residents becomes stricter, the expected term of residency decreases, and the equivalent rent metric increases. This is true for both males and females. The insurance policy component of the entry fee is substantial, representing around 50% of the entry fee.

5.3.2 Sensitivity to the Financial Parameters

In our model we have assumed that the interest rate is 4% and the inflation rate is 2% for the purpose of computing the future maintenance fees and the DMF when it applies to the resale value of the unit. The assumed RV contract details are shown in Table 7.

In our numerical calculations so far we have assumed a volatility of 20% for the resale value of the unit. In this sensitivity analysis we have changed the financial variables up or down by 50% of their base case values.

INSERT TABLE 7 HERE

The scenarios and the results are shown in Table 8.

If there is no capital gain sharing then varying the volatility would make no difference to any of the metrics. Scenario 0 is our base case scenario for the variables of concern. If the DMF applies to the resale value instead of the entry fee then changes to the inflation assumption make a bigger impact on the metrics. The results of Scenarios 1 and 2 compared to Scenario 0 indicate the impact of changes to the interest rate. The results of Scenarios 3 and 4 compared with Scenario 0 indicate the impact of changes to the inflation rate. The results of Scenarios 5 and 6 compared with Scenario 0 indicate the impact of change to the assumed volatility of the resale value. Examining the results we see that the ER is more sensitive to changes in the interest rate than to changes in the volatility and is least sensitive to changes in the inflation rate. The ER increases with the interest rate and decreases with the volatility.

INSERT TABLE 8 HERE

6 Risks

6.1 Complexity and Confusion

There is significant variation in RV contract design and their DMFs. Some RVs offer consumers a choice of contract for a particular RV unit in the form of a choice between a lower entry fee and a higher deferred management fee. For example, the Blue Haven RV in Kiama offers a choice between a standard contract with a DMF of 30% after 5 years tenure or a contract with an entry fee of 70% of the standard contract entry fee but with a DMF of 100% of the entry fee after 1 year.

Some RVs may have a maximum DMF of 30% after 10 years whereas others have a maximum DMF of 30% after 2 years. We are aware of some RVs that have a 100% DMF, meaning that the resident gets no refund when they leave the RV regardless of their tenure. Another contract we have seen had a DMF of 10% of the entry fee each year capped at a maximum of 100% after 10 years.

Due to this inherent complexity, it is very difficult for consumers to know which RV contract is best. Our results indicate that generally RV contracts provide better value for money for those who are likely to have a long tenure than for those whose tenure is likely to be short. A significant risk in RV contracts is the possible insolvency of the operator. The legislation in each state should ensure that every resident who wants or needs to leave the village definitely receives the refund of the entry payment within a reasonable time frame. Unlike for residential aged care, a government guarantee for the refund does not yet exist (McCullagh, 2014).

In this regard, insolvency must not necessarily only be linked with mis-management but also with an unusually large number of exits from the village during a short time; for example because an influenza epidemic among the RV residents leads to a spike in the number of deaths. Insurance companies are exposed to similar risks and they are forced by law to have adequate reserves or reinsurance to cover any valid insurance claims made. This approach does not apply to RVs.

However, in Queensland and South Australia, a so-called capital replacement fund is already regulated by law, whereby a percentage of each resident's ingoing contribution is paid into that fund (Retirement Villages Act 1999 (QLD) 2019, s. 17). The fund was introduced to replace the RV's capital items or to fund planned maintenance. The capital replacement / maintenance fund was not established for the purpose of protecting consumers from the risks involved in obtaining their refund. Most of the Australian states' legislation demands that the entry payment is held in a trust until the prospective resident finally enters into the contract or notifies in writing that they will not enter into the contract. However, this provides only short-term protection which vanishes once the contract is entered into (e.g. Retirement Villages Act 2012 (ACT) No 13 (2019, s. 39); Retirement Villages Act 1999 (NSW) No 81 (2019, s. 23(4)); Retirement Villages Act 1986 (VIC) (2014, s. 52(2)); Retirement Villages Act 1992 (WA) (2018, s. 18(1))).

Some significant risks for RV residents arise at the time of exit from the RV, whether voluntary or not. This includes the possibility of lengthy delays in receiving the exit payment and additional costs incurred for reinstatement or refurbishment. The exit payment is typically required to fund entry to alternative accommodation. The average time taken between vacant possession and settlement is 258 days (PwC, 2019), representing a delay of 8.5 months or more between exit and the resale of the RV unit. Most RVs fund the exit payment by finding a new tenant to take over the RV unit that was vacated. Some RVs have buyback arrangements where the operator will buy the RV unit back from the departing resident. The average buyback period for Australia is 19 months. Under some jurisdictions (e.g. NSW, SA, WA) the operator is only allowed to terminate a resident's contract if specific grounds are met and if the contract is a lease or license arrangement (Retirement Villages Act 1999 (NSW) No 81 (2019, s. 129); Retirement Villages Act 2016 (SA) (2019, s. 44); Retirement Villages Act 1992 (WA) (2018, s. 17)). However, this is not a big hurdle for an operator. First, the leasehold is the most widespread legal structure, especially among for-profit operators. Second, the possible reasons for termination include not only serious breaches of the contract or damage caused by the resident but also a decline in health

(McCullagh, 2014). Elderly Australians who survive to age 65 can expect to live a further 19.9 years if male or 22.6 years if female (AIHW, 2020). Thus, after becoming too disabled to live in a RV, a retiree depends on receiving the exit payment in order to afford alternative accommodation. Despite the legal time limits for an operator to pay the exit payment, there are exceptions where those time limits do not apply. For example in Queensland, there is no deadline in case of voluntary exit and in South Australia there is only an 18-month time limit unless the resident moves to an aged care facility (Retirement Villages Act 1999 (QLD) 2019; Retirement Villages Act 2016 (SA) 2019). In Western Australia, the limits are not applicable if the contract provides the right for a resident to appoint an agent in order to sell the unit whereas in Victoria the deadline ceases to exist if this right to sell the unit is in favour of the operator (Retirement Villages Act 1992 (WA) 2018; Retirement Villages Act 1986 (VIC) 2014).

We also state and discuss the risk for a resident who leaves the retirement village due to disability and poor health status in Appendix C.

Regarding the maintenance fees, the original developer of the RV may arrange for other (possibly associated) firms to provide maintenance services under long-term contracts. The cost of the maintenance fees may then be higher than would be the case if the maintenance services were subject to competition by other providers. The RV may not itself benefit from the maintenance fees charged but this does not necessarily mean the RV residents are not being overcharged. This phenomenon, as it relates to strata title, is well documented; see Sherry (2010). The maintenance fees are part of the cost of the RV contract and using our metrics this can be quantified as an equivalent up front cost. However, this is complicated and depends on the age, gender, and survival prospects of the consumer.

6.2 Uncertainty about the amount and timing of the refund on leaving the RV and the adequacy for future needs

Consider a hypothetical (but realistic) retirement village contract where the entry

fee is $1m and the deferred management fee reaches a maximum of 30% of the resale value of the unit after 5 years, the resident leaves after 5 years, and the annual growth in the resale value (meaning the entry fee charged to a new resident) is 4.1% p.a. (based on the PwC censuses for 2015-2019 average price). Assume the resident has to pay $50,000 for refurbishment of the unit to modernise the bathroom and kitchen. Assume that the resident gets a 50% share of the "capital gain" defined as the difference between the entry price paid by the new tenant and the entry price paid by the departing tenant.

The departing resident's refund received is calculated as

Refund = Entry fee paid – DMF charged + resident share of capital gain
– refurbishment cost

Table 9 shows the calculation of the refund received by the departing tenant for four scenarios varying the term T and the growth rate g of the resale price.

INSERT TABLE 9 HERE

In Scenario 1 from Table 9 the refund is less than 70% of the entry fee paid, in Scenario 2 it is less than 75%, and in Scenarios 3 and 4 it is 65% of the entry fee paid. Scenarios 3 and 4 give the same results for the refund we would obtain if the contract had no capital gain sharing and the DMF was based on the entry fee instead of the resale value. It must also be noted that the RV operator has the use of the resident's money for the term of their residence and this is an opportunity cost for the resident.

This shows that the refund received could be less than the entry fee paid by a substantial amount even if the resident shares in the capital gain, so if the departing resident needs to obtain other accommodation the refund may be insufficient to pay for new accommodation of the type and standard required. This problem is compounded by the lengthy delay in receiving the refund from the RV operator as discussed above. This is particularly problematic if the departing resident has to move to residential aged care.

7 Conclusions

We have shown that RV contracts can be interpreted as a combination of complex insurance and financial products. This paper provides a new approach to financially evaluating RV contracts from a consumer's perspective, using various financial and demographic metrics. We have adopted demographic assumptions that may be considered appropriate for a risk averse consumer who does not know whether their health and their survival function is average or better than average. The metrics allow for financial quantification of the costs and benefits of RV contracts and for comparison with other residential and financial arrangements. We do not consider the modelling from the RV owner or investor's perspective.

The equivalent monthly rent metric allows consumers to compare different RV contracts and compare RV contracts with other accommodation options. This metric has the benefit of being easily understood, although the method for computing it is not straightforward. Measurement of the economic value of the components of the cost and benefits provides consumers with more information about the relative attractiveness of a particular RV contract compared with other RV contracts or other residential arrangements. It also reveals the true nature of the RV contract as providing the right to receive accommodation services combined with complex insurance and financial products, bundled together as one package. Therefore, the cost not only only represents the entry fee, it comprises the entry fee combined with the obligation to pay the maintenance fees.

The methodology in this paper allows for quantification of possible trade-offs between different features of the contract design and the costs and benefits of the contract. The results of our sensitivity and scenario analyses[3] show that under quite reasonable financial and demographic assumptions, a substantial proportion of the entry fee paid contributes to the insurance benefits rather than for the right to reside in the village. Residents are buying insurance products from an organisation which is not set up to provide insurance and which is not subject to

[3]We have also included the sensitivity analysis for the contractual parameters in Appendix B.

the solvency, prudential regulation or financial and consumer protection regulation that applies to insurers. The paper also shows how a RV's policy on termination of residency due to ill health may impact on the attractiveness of the RV for potential new residents.

Several public policy implications can be drawn from our findings. First, the consumer should be enlightened about the true nature of RV contracts and the potential costs they will have to face. Potential residents need to understand the risk that they might be forced to leave the RV due to disability and that entry to an associated age care facility is not assured. Second, retirees have to pay a large entry fee in advance of when the benefits under the contract are delivered. In case of insolvency of the operator, the payment of the exit fee to the resident is not guaranteed. RV contracts are very similar to insurance products; accordingly, there is a case for RVs being required to have adequate reserves to cover their obligations to residents. Most RV residents fund their RV entry fee by selling their home, which is likely to be their most significant asset.

Further research in this area could explore alternative approaches to estimating the survival function used in the valuation. In addition, alternative approaches to option valuation could be employed to value the capital gain benefit. This paper is focused on the methodology for quantifying the metrics and revealing the true nature of RV contracts rather than on the difficult issue of estimating the parameters.

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Appendices

Appendix A Brief Description of Transition Matrix Approach

The Australian Bureau of Statistics (2012) identifies four different levels of disability, which are defined in terms of the so called 'core-activity limitations' (CAL) which are likely to last for at least six months.

These four levels, in decreasing order of disability, are profound, severe, moderate, and mild core activity limitations. See Australian Bureau of Statistics (2012) for details.

Hariyanto et al. Pitt (2014) and Hariyanto and Pitt (2014) developed a method to estimate the probability of transition at individual ages between disability states in the above framework. Their work is part of a wider project on reverse mortgages, and consequently it focuses on transition probabilities at older ages. The demographic characteristics of reverse mortgage customers are similar to those of RV customers. Our interest in this work is in using the age specific transition probabilities between the six different states (including an 'alive and no CAL' state and a 'dead' state) provided in those papers for demographic modelling of the population. At each age from 60–109 the states are: (1) alive with no disability; (2) alive with mild disability; (3) alive with moderate disability; (4) alive with severe disability; (5) alive with profound disability; and (6) dead.

The entry in row i, column j of the transition matrix ${}^{x}\mathbf{A}$ is the probability that a person who is in state i at age x will move to state j at age $x + 1$. For instance, for males aged x = 75 and x + 1 = 76, the transition probabilities are summarised in the following 6 × 6matrices,

$$^{75}\mathbf{A} = \begin{bmatrix} 0.8506 & 0.0696 & 0.0216 & 0.0080 & 0.0182 & 0.0320 \\ 0.1349 & 0.7604 & 0.0323 & 0.0135 & 0.0271 & 0.0318 \\ 0.0000 & 0.1411 & 0.7552 & 0.0224 & 0.0466 & 0.0346 \\ 0.0000 & 0.0000 & 0.0953 & 0.7556 & 0.0651 & 0.0839 \\ 0.0000 & 0.0000 & 0.0000 & 0.0844 & 0.7892 & 0.1264 \\ 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 & 1.0000 \end{bmatrix}$$

and

$$^{76}\mathbf{A} = \begin{bmatrix} 0.8379 & 0.0752 & 0.0231 & 0.0084 & 0.0201 & 0.0354 \\ 0.1324 & 0.7543 & 0.0342 & 0.0143 & 0.0296 & 0.0352 \\ 0.0000 & 0.1408 & 0.7455 & 0.0238 & 0.0514 & 0.0385 \\ 0.0000 & 0.0000 & 0.0953 & 0.7424 & 0.0726 & 0.0896 \\ 0.0000 & 0.0000 & 0.0000 & 0.0818 & 0.7875 & 0.1307 \\ 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 & 1.0000 \end{bmatrix}$$

Hariyanto and Pitt (2014) provide estimates of the transition matrices separately for males and females over various ages; we use the age range 60–100. These data create survival functions, showing the proportion of survivors in the RV population in each of the six states at age $x + t$ from a single new entrant aged x who joined the RV population in good health at time 0. For example, consider just one individual, at time 0, entering the RV at age $x = 75$ in the 'alive and well' state; no other individuals, say, are in any of the other five states at that age. We can represent this as $\mathbf{p}_{75} = (1 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0)$.

One year later, subject to the transition probabilities $^{75}\mathbf{A}$ the distribution across the six states of the descendants at age 76 is

$$\mathbf{p}_{76} = (0.8506 \quad 0.0696 \quad 0.0216 \quad 0.0080 \quad 0.0182 \quad 0.0320) \ .$$

The relationship $\mathbf{p}_{x+1} = \mathbf{p}_x{}^{x}\mathbf{A}$ gives the age x + 1 distribution across the six health states in terms of the age x distribution. We can use this to obtain the age x + 2 distributions of health states from the age x distribution by iterating this relationship as follows,

$$\mathbf{p}_{x+1} = \mathbf{p}_x{}^{x}\mathbf{A}^{x+1}\mathbf{A}$$

giving

$$\mathbf{p}_{77} = \mathbf{p}_{76}{}^{76}\mathbf{A} = (0.7219 \quad 0.1195 \quad 0.0389 \quad 0.0161 \quad 0.0351 \quad 0.0684) \ .$$

We can obtain the age x +t distribution of the six health states from the age x

distribution using the relationship

$$\mathbf{p}_{x+t} = \mathbf{p}_x{}^{x}\mathbf{A}^{x+1}\mathbf{A} \dots {}^{x+t-1}\mathbf{A}.$$

Using these vectors we can obtain the probability of survival in states $i < j$ for $1 \leq j \leq 5$. We can think of survival in terms of being alive regardless of the health state, in terms of being alive and non-disabled, or in terms of being alive with at worst some specific level of disability. Let $\mathbf{p}_{x+t}(i)$ be the ith component of the vector $\mathbf{p}_{x+t}$, then $\mathbf{p}_{x+t}(1)$ is the number of healthy survivors at time t of the one person entering the RV at age x in good health, $\mathbf{p}_{x+t}(1) + \mathbf{p}_{x+t}(2)$ is the number of survivors at time t who are either in good health or have the lowest level of disability, $\sum_{i=1}^{5} \mathbf{p}_{x+t}(1)$is the number of survivors who are still alive at time t regardless of their health state. Using these alternative definitions of survival we can obtain different survival functions $P_H(x, t)$. Three of the possible survival functions for times t = 0, 1, 2 for a male aged 75 at entry are shown in Table A1.

INSERT TABLE A1 HERE

We do not have reliable demographic data about the RV population or about the level of disability at which the resident may be forced to move into an aged care facility. However, this adjustable definition of survival allows for approximately quantifying the effect of different policies regarding when a resident's health has declined enough to force relocation to an aged care facility. Using the transition matrix data, we can produce a survival function for either males or females, for a range of entry ages, as well as for different types of survival. We shall assume the middle Survival Function (Function 3) is appropriate for modelling the RV population, so that severe or profound disability leads to exit from the RV but milder forms of disability do not.

Appendix B Sensitivity to the Contractual parameters

B.1 Effect of changes to the Deferred Management Fee

In further sensitivity analysis, we want to measure the impact of variation in the DMF and the capital gain starting with the DMF. We use Survival Function 3 in the calculations for the scenarios shown in Table B1.

Under the financial base case assumptions and the contractual details above, we obtain the results shown in Table B2 for males and females aged 75.

INSERT TABLE B1 HERE

INSERT TABLE B2 HERE

Changing the DMF rate per year or number of years it applies as per Scenarios 1, 2 and 3 in Table B2 makes a substantial difference to the equivalent rent metrics for both males and females. An increase in the DMF charge rate or an increase in the DMF term will decrease the insurance benefit received on exit and thus reduce $\frac{V_{INS}}{EF}$ and increase the ER. A change from applying the DMF charge rate to the entry fee to applying it to the resale value of the unit also decreases $\frac{V_{INS}}{EF}$ and increases the ER.

B.2 Effect of changes to the capital gains sharing

Increasing the share of the capital gains payable to the departing RV resident increases the economic value of that component of the benefits provided and reduces the equivalent rent metric. We consider the effect on the metrics of increasing the resident's share of the capital gain for the three RV contract scenarios shown below in Table B3. We quantify this for a female new entrant aged 75 using both Survival Function 3 and Survival Function 5.

Metrics for the capital gain share scenarios are presented in Table B4.

We observe that increasing the capital gain share received by the RV resident

as per the above scenarios makes a big difference to the ER. Full sharing of the capital gain reduces the ER by more than 60% compared with the ER with no sharing of the capital gain.

INSERT TABLE B3 HERE

INSERT TABLE B4 HERE

Appendix C Time difference between leaving the village due to disablement and dying

Table C1 shows the life expectancy, expected term of RV residence, and the difference between these measures for residents aged 70, 75 and 80. The last column indicates the number of years for which the retiree has to find an alternative accommodation after exit from the RV. The calculation is based on assuming Survival Function 3 for estimating the expected term of RV residence.

INSERT TABLE C1 HERE

Consider a male resident who enters the RV at age 75. On average he will live for 11.5 years but on average he will exit the RV in 9.8 years and can expect to live another 1.7 years. For a female resident of this age the difference is 2.9 years. A person who is forced to move out of the RV due to disability will need money to pay for relocating to alternative accommodation for the remainder of their life. If the RV delays paying the exit fee to the departing resident, this may cause them or their family financial hardship and inconvenience. Furthermore, this is likely to happen at a time when the departing resident is in poor health and less capable of engaging in a dispute with the RV over the issue.

Table 1: Base Case Assumptions.

Parameter	Symbol	Value
continuous risk free interest rate	r_F	3.92%
interest rate effective p. a.	i	4.00%
volatility of RV Resale Price	σ	20.00%
dividend yield on RV unit	y	0.00%
CPI inflation rate	g	2.00%
real estate price inflation	g	2.00%

Table 2: Sample of RV contracts used in modelling.

Scenario	Dwelling type	Entry Fee (EF)	Monthly Maintenance Fee (MF)	DMF in % per year	DMF term	Capital Gain Share (CG)
1	1BR	$131, 000	$316.68	10.0%	10	0.0%
2	IBR	$150, 000	$520.00	6.0%	5	0.0%
3	1BR	$199, 000	$557.92	5.0%	6	0.0%
4	1BR	$250, 000	$326.08	6.0%	5	0.0%
5	1BR	$250, 000	$363.09	6.0%	5	0.0%
6	IBR	$410, 000	$522.75	5.5%	5	0.0%
7	1BR	$410, 000	$182.87	2.5%	15	100.0%
8	2BR	$520, 000	$658.40	5.5%	5	0.0%
9	1BR	$525, 000	$520.00	4.0%	10	0.0%
10	1BR	$550, 000	$103.85	5.0%	6	0.0%
11	2BR	$840, 000	$371.80	2.5%	15	100.0%
12	2BR	$1,350,000	$1, 574.00	2.5%	10	50.0%

Table 3: Metrics for Different Scenarios.

Scenarios (a) and (b)	Entry Fee ($000)	Equivalent Rent p.m.	Expected term (years)	$\frac{V_{MF}}{EF}$	$\frac{V_{INS}}{EF}$	$\frac{V_{CG}}{EF}$	$\frac{V_{LI}}{EF}$
1a	$131	$1, 400	10.7	27%	7%	0%	120%
2a	$150	$1, 238	10.7	39%	46%	0%	93%
3a	$199	$1, 499	10.7	32%	47%	0%	85%
4a	$250	$1, 523	10.7	15%	46%	0%	69%
5a	$250	$1, 560	10.7	16%	46%	0%	70%
6a	$410	$2, 420	10.7	14%	48%	0%	66%

7a	$410	$590	10.7	5%	49%	40%	16%
8a	$520	$3, 065	10.7	14%	48%	0%	66%
9a	$525	$3, 164	10.7	11%	43%	0%	68%
10	$550	$2, 705	10.7	2%	47%	0%	55%
11a	$840	$1, 207	10.7	5%	49%	40%	16%
12a	$1, 350	$4, 890	10.7	13%	52%	20%	41%
1b	$131	$1, 252	10.7	27%	20%	0%	108%
2b	$150	$1, 183	10.7	39%	50%	0%	89%
3b	$199	$1, 427	10.7	32%	51%	0%	81%
4b	$250	$1, 431	10.7	15%	50%	0%	65%
5b	$250	$1, 468	10.7	16%	50%	0%	66%
6b	$410	$2, 282	10.7	14%	52%	0%	63%
7b	$410	$439	10.7	5%	53%	40%	12%
8b	$520	$2, 889	10.7	14%	52%	0%	63%
9b	$525	$2, 926	10.7	11%	48%	0%	62%
10b	$550	$2, 505	10.7	2%	51%	0%	51%
11b	$840	$896	10.7	5%	53%	40%	12%
12b	$1, 350	$4, 507	10.7	13%	56%	20%	38%

Table 4: Contractual assumptions set 1.

Dwelling type	2BR
Entry Fee (EF)	$500, 000
Maintenance Fee per month (MF)	$563.64
DMF in % per year	6.0%
DMF term	5
Capital Gain Share (CG)	0.0%

Table 5: Metrics obtained using the "transition matrix" approach to computing the survival functions.

Scenario	Entry Age	Gender	Survival Curve	Expected term	Equivalent Rent	$\frac{V_{MF}}{EF}$	$\frac{V_{INS}}{EF}$	$\frac{V_{CG}}{EF}$	$\frac{V_{LI}}{EF}$
1	70	M	3	11.3	$2, 720	13%	49%	0%	64%
2	75	M	3	8.6	$2, 980	10%	56%	0%	55%
3	80	M	3	6.5	$3, 247	8%	62%	0%	46%
4	70	M	5	14	$2, 543	16%	44%	0%	72%
5	75	M	5	11	$2, 755	13%	50%	0%	63%
6	80	M	5	8.7	$2, 988	10%	55%	0%	55%
7	70	F	3	11.8	$2, 697	14%	48%	0%	66%
8	75	F	3	8.7	$2, 994	11%	55%	0%	56%
9	80	F	3	6.3	$3, 327	8%	62%	0%	46%
10	70	F	5	17	$2, 392	19%	38%	0%	81%
11	75	F	5	13.3	$2, 601	15%	44%	0%	71%

12	80	F	5	10.1	$2, 869	12%	51%	0%	61%

Table 6: Effect of variation in the underlying survival functions.

Scenario	Entry Age	Gender	Survival Curve	Expected term	Equivalent Rent	$\frac{V_{MF}}{EF}$	$\frac{V_{INS}}{EF}$	$\frac{V_{CG}}{EF}$	$\frac{V_{LI}}{EF}$
1	75	M	5	11.5	$2, 719	13%	48%	0%	65%

2	75	M	4	10.2	$2, 825	12%	51%	0%	61%
3	75	M	3	9.8	$2, 856	12%	52%	0%	59%
4	75	M	2	9.6	$2, 875	11%	53%	0%	58%
5	75	M	1	8.1	$3, 018	10%	57%	0%	53%
6	75	F	5	13.6	$2, 575	16%	44%	0%	72%
7	75	F	4	11.3	$2, 736	13%	49%	0%	64%
8	75	F	3	10.7	$2, 773	13%	50%	0%	62%
9	75	F	2	10.6	$2, 780	13%	51%	0%	62%
10	75	F	1	9.3	$2, 885	11%	54%	0%	57%

Table 7: Contractual assumptions set 4.

Entry Fee (EF)	$500, 000
Maintenance Fee per month (MF)	$563.64
DMF in % per year	6.0%
DMF term	5
DMF applies to	RV
Capital Gain Share (CG)	50.0%
Age of new entrant	75
Gender of new entrant	F

Table 8: Effect of variation in financial parameters.

Scenario	Financial parameters (i, g, σ)	Survival Curve	Expected term	Equivalent Rent	$\frac{V_{MF}}{EF}$	$\frac{V_{INS}}{EF}$	$\frac{V_{CG}}{EF}$	$\frac{V_{LI}}{EF}$
0	(4%, 2%, 20%)	3	10.7	\$2, 071	13%	46%	20%	47%
1	(**6**%, 2%, 20%)	3	10.7	\$2, 414	11%	40%	24%	48%
2	(**2**%, 2%, 20%)	3	10.7	\$1, 703	15%	55%	16%	44%
3	(4%, **3**%, 20%)	3	10.7	\$2, 079	14%	44%	20%	50%
4	(4%, **1**%, 20%)	3	10.7	\$2, 067	12%	48%	20%	44%
5	(4%, 2%, **30**%)	3	10.7	\$1, 903	13%	46%	24%	43%
6	(4%, 2%, **10**%)	3	10.7	\$2, 207	13%	46%	17%	50%
0	(4%, 2%, 20%)	5	13.6	\$1, 920	16%	39%	23%	53%
1	(**6**%, 2%, 20%)	5	13.6	\$2, 247	14%	32%	27%	54%
2	(**2**%, 2%, 20%)	5	13.6	\$1, 570	18%	49%	19%	51%
3	(4%, **3**%, 20%)	5	13.6	\$1, 923	17%	36%	23%	58%
4	(4%, **1**%, 20%)	5	13.6	\$1, 921	15%	42%	23%	50%
5	(4%, 2%, **30**%)	5	13.6	\$1, 779	16%	39%	27%	50%
6	(4%, 2%, **10**%)	5	13.6	\$2, 028	16%	39%	20%	56%

Table 9: Scenarios for refund calculation

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Assumption				
Growth rate (g) of entry fee % p.a.	4.10%	4.10%	0.00%	0.00%
Term of residence (T)	5	10	5	10
Accumulation of $1 at growth rate g for T years	1.222513455	1.494539147	1	1
Entry fee	$1,000,000.00	$1,000,000.00	$1,000,000.00	$1,000,000.00
Resale price	$1,222,513.45	$1,494,539.15	$1,000,000.00	$1,000,000.00
DMF on resale price %	30%	30%	30%	30%
Cap gain share %	50%	50%	50%	50%
Refurbish cost	$50,000.00	$50,000.00	$50,000.00	$50,000.00
Exit entitlement				
Entry fee	$1,000,000.00	$1,000,000.00	$1,000,000.00	$1,000,000.00
Resale value	$1,222,513.45	$1,494,539.15	$1,000,000.00	$1,000,000.00
DMF on resale price $	$366,754.04	$448,361.74	$300,000.00	$300,000.00
Cap gain share $	$111,256.73	$247,269.57	$0.00	$0.00
Refurbish cost	$50,000.00	$50,000.00	$50,000.00	$50,000.00
Refund	$694,502.69	$748,907.83	$650,000.00	$650,000.00

Table A1: Different survival functions for male aged 75.

Survival type	Time		
	t = 0	t = 1	t = 2
Alive and well (curve 1)	1.0000	0.8506	0.7219
Well or mild disability (curve 2)	1.0000	0.9202	0.8414
Alive and any disability level (curve 5)	1.0000	0.9680	0.9316

Table B1: Contractual assumptions 2

Scenario	Entry Fee (EF)	Monthly Maintenance Fee (MF)	DMF in % per year	DMF term	DMF applies to Entry Fee / Resale Value	Capital Gain Share (CG)
1	$500, 000	$563.64	6.0%	5	EF	0.0%

2	$500, 000	$563.64	10.0%	5	EF	0.0%
3	$500, 000	$563.64	10.0%	10	EF	0.0%

Table B2: Effect of variation in the DMF

Scenario	Entry Age	Gender	Survival Curve	Expected term	Equivalent Rent	$\frac{V_{MF}}{EF}$	$\frac{V_{INS}}{EF}$	$\frac{V_{CG}}{EF}$	$\frac{V_{LI}}{EF}$
1	75	M	3	9.8	$2, 856	12%	52%	0%	59%
2	75	M	3	9.8	$3, 417	12%	41%	0%	71%
3	75	M	3	9.8	$4, 284	12%	23%	0%	89%
1	75	F	3	10.7	$2, 773	13%	50%	0%	62%
2	75	F	3	10.7	$3, 286	13%	39%	0%	74%
3	75	F	3	10.7	$4, 133	13%	20%	0%	93%

Table B3: Contractual assumptions 3

Scenario	Entry Fee (EF)	Monthly Maintenance Fee (MF)	DMF in % per year	DMF term	DMF applies to Entry Fee / Resale Value	Capital Gain Share (CG)
1	$500, 000	563.64	6.0%	5	EF	0.0%
2	$500, 000	563.64	6.0%	5	EF	50.0%
3	$500, 000	563.64	6.0%	5	EF	100.0%

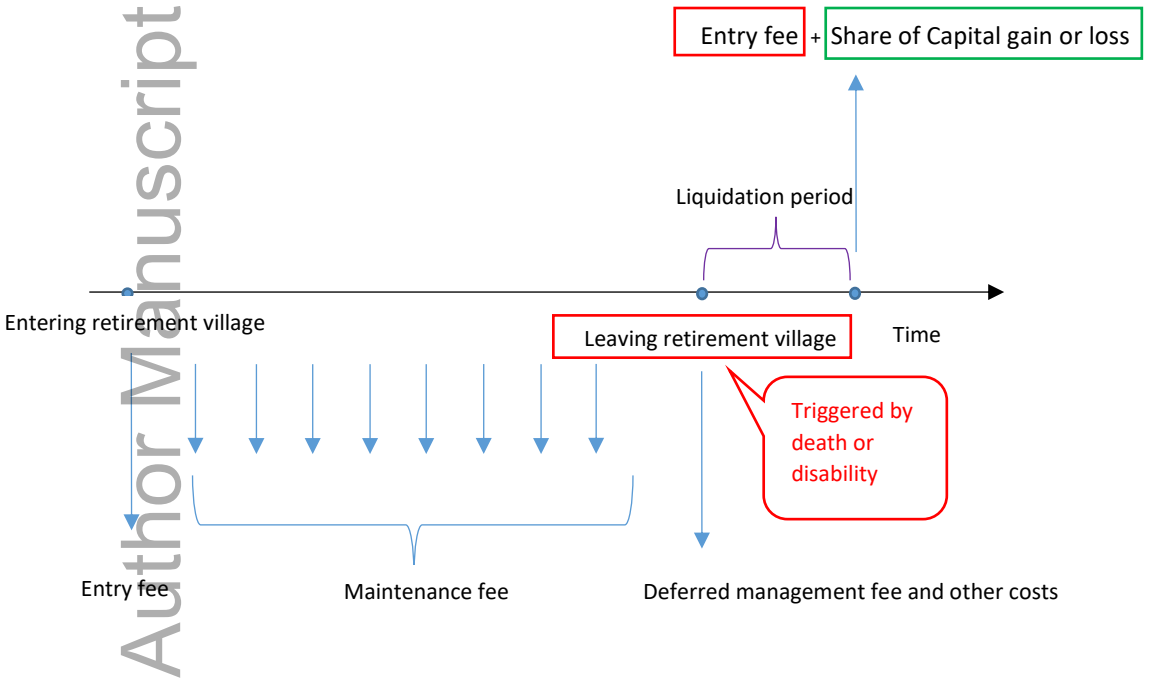
Table B4: Effect of variation in the share of the capital gain

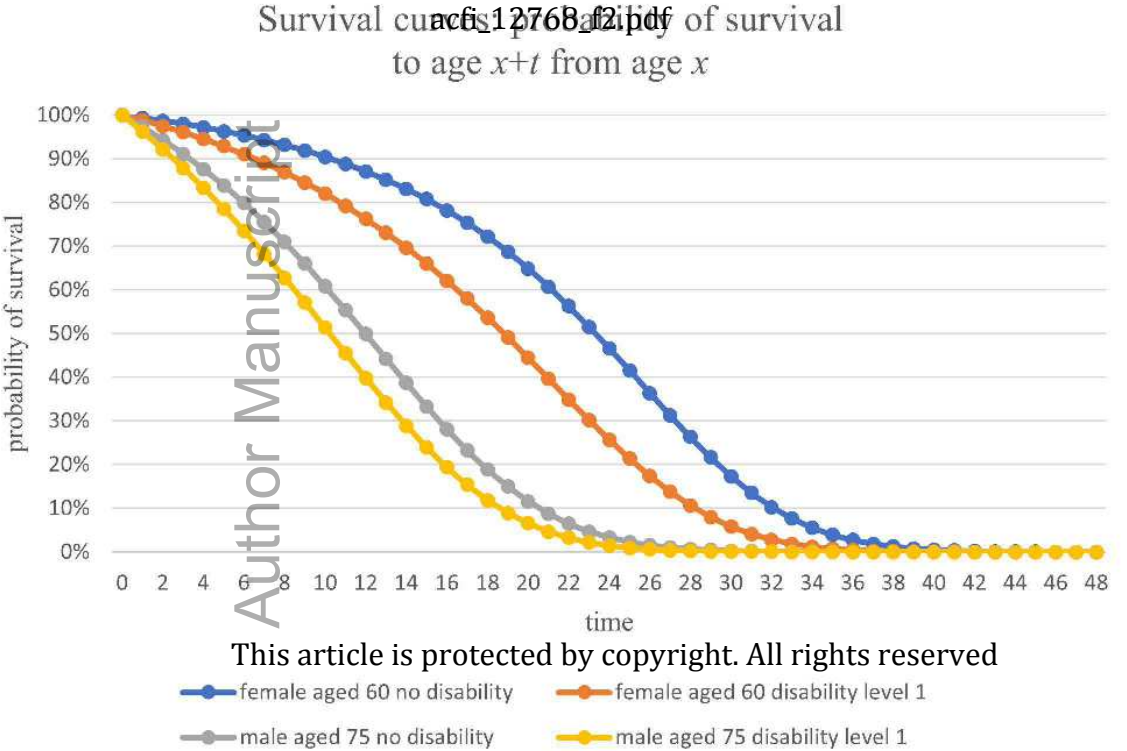
Scenario	Entry Age	Gender	Survival Curve	Expected term	Equivalent Rent	$\frac{V_{MF}}{EF}$	$\frac{V_{INS}}{EF}$	$\frac{V_{CG}}{EF}$	$\frac{V_{LI}}{EF}$
1	75	F	3	10.7	$2, 773	13%	50%	0%	62%
2	75	F	3	10.7	$1, 887	13%	50%	20%	43%
3	75	F	3	10.7	$1, 002	13%	50%	40%	23%
1	75	F	5	13.6	$2, 575	16%	44%	0%	72%
2	75	F	5	13.6	$1, 741	16%	44%	23%	49%
3	75	F	5	13.6	$907	16%	44%	46%	25%

Table C1: Time difference between leaving the village due to disablement and

dying.

	Age at entry	Life expectancy	Expected Term of RV residence	Difference
Male Resident	70	14.9	12.8	2.1
	75	11.5	9.8	1.7
	80	8.4	7.2	1.2
Female Resident	70	17.5	13.9	3.6
	75	13.6	10.7	2.9





Author/s:
Kyng, T;Pitt, D;Purcal, S;Zhang, J

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