SIMULATING SHOPPING CENTRE RETURNS

Jennifer Simmonds – RMIT University (graduate student)

John Flaherty - RMIT University contact
(contact - john.flaherty@rmit.edu.au)

Robert Webster – RMIT University

Presented at

ABSTRACT

Key Words: Monte Carlo simulation, risk, future cash flows, valuation

Small suburban shopping centres are a common feature of urban Australia. There are a number of standard approaches to valuing such centres, most of which are based on turnover and location. How reliable is a good location if a competitive centre draws your customers away or if there is a shift in preferences by existing customers to shop elsewhere, a more convenient centre or through the Internet.

The shopping centre is an asset which represents a stream of future cash flows to its owners, and the reliability of these cash flows determines the ultimate value of the centre. Monte Carlo simulation can provide a good deal of insight into change in the value of the asset and help identify potential risk factors impacting on returns.

This paper uses a spreadsheet-based model to examine the impact of key variables on the market value of a shopping centre.

INTRODUCTION

The definition of value generally adopted in Australia is that from The International Asset Valuation Standards Committee (Professional Practice 2000):

- 'the estimated amount for which an asset should exchange on the date of the valuation between a willing buyer and willing seller in an arms length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently, and without compulsion'

With respect to property valuations there are a number of different approaches available to determine the value estimate. The Income or Capitalisation Approach is most meaningful when dealing with income producing property such as a shopping centre. Using this method a value conclusion is achieved by converting the sustainable net income flows into a valuation using a capitalisation rate adopted with reference to comparable sales transactions in the market.

An income producing property such as a shopping centre is also particularly suited to the Discounted Cash Flow (DCF) Approach. Much of the information required on the many variables used in a DCF approach is more readily available than the sale of comparable properties which are required to determine the capitalisation rate needed for the Income Approach mentioned previously. (Although at a neighbourhood centre level in Australia in recent years there has been ample evidence of sales of this type of centre as institutional investors have refocused their property portfolios on much larger/more costly properties). Evidence of income streams through effective rents, vacancy levels, lease concessions & incentives and operating expenses unique to the particular centre are more readily available than sales transactions for this type of property. This data allows a valuer to construct a DCF model that simulates investor considerations for the particular property being analysed.

Shortcomings in the Income Approach lie in the area of estimating vacancy levels and take up rates, forecasting rental increases through both base rents and turnover rentals and the ability of the owner to pass on increases in operating expenses.

A major difficulty in the construction of the DCF model is the estimation of the terminal value of the property using a direct capitalisation. Given that this is generally ten years into the future the valuer needs to make various judgements regarding the expectation of leases in existence at that time, the level of rentals, vacancy factors, the age and condition of the property and the need for capital expenditure. All these issues together with estimates of potential competition will influence the assessed risk at the end of the time period under review and thus the assumptions made in determining the terminal value.

The Australian Property Institute does not currently have a standard on the use of DCF for valuation purposes – the former standard having been withdrawn at the end of 1998. A re-draft of the standard is currently available as an exposure draft and was the subject of a paper at the recent World Valuation Congress held in Melbourne in April 1999[1]. Parker et al (1999) reported the difficulty in developing the standard and the context in which DCF was to be used for valuation purposes compared with its use for investment evaluation purposes. For valuation purposes, as a general market assessment, there is a need to use an un-geared, before tax situation with a corresponding discount rate. For investment evaluation purposes (which are generally specifically tailored to a particular situation) there is a need to look at an investor's specific requirements. This will include both gearing and tax issues taking into account the peculiarities of the specific investor's taxation position. These issues may also affect the discount rate to be used.

LITERATURE REVIEW

Eppli and Benjamin's (1994) extensive review and analysis of shopping centre research found that retail research had evolved over the past 60 years into four main groups: 1) Central Place Theory, 2) Homogenous Retailer Agglomeration, 3) Retail Demand Externalities, and 4) Shopping Centre Valuation. They found that shopping centre value is clearly based on current and future cash flows. Understanding what factors significantly influence these cash flows (ie rents), and the magnitude of this influence, is important in ultimately determining a valuation for the centre.

Sirmans and Guidry (1993) undertook a detailed empirical study of the determinants of rent variations across shopping centres. They found significant relationships between rental levels and factors such as the age of the centre, its size and design, customer drawing power, the type of anchor tenant, location and current economic conditions. Prior to this study little in the way of empirical research had been undertaken.

A subsequent paper by Sirmans et al (1996) examined the effect of the loss of an anchor tenant on rental levels of the remaining tenants in small to moderately sized centres. Their study found that the loss of an anchor tenant effects the drawing capacity of the centre, results in a decline of occupied space, and other rentals are subsequently forced down due to the loss of drawing power and higher level of vacancies. These conclusions are particularly relevant because the centre

---

[1] Parker D., Robinson J., 1999

which forms the basis of this paper has one anchor tenant and a small number of specialty stores whose individual drawing power would be limited.

DESCRIPTION

This paper uses data collected from a small suburban shopping centre categorised by the Property Council of Australia as fulfilling the criteria of a 'Neighbourhood Centre'. Neighbourhood centres are generally local area shopping centres comprising a supermarket and up to 35 specialty stores. Key features of this particular shopping centre classification include:

- a Gross Lettable Area – Retail (GLAR) of less than 10,000 square metres
- is located in a residential area
- services the immediate neigbourhood
- has extended trading hours and
- caters for day to day retail requirements.

The shopping centre is owned by a tax-exempt body, and is located adjacent to a university campus. It was purchased on 1 January 1985 for 2.375 million dollars. The centre has a GLAR of 4256.30 square metres and comprises a major Supermarket, a Bank and 13 specialty shops. The supermarket occupies 3110 square metres of the shopping centre, or approximately 73%. The bank occupies 240 square metres or 8% of the centre. The remaining 907 square metres, or 19% of the centre, is taken up by the 13 specialty shops. These include the following tenancy types:

- Butcher
- Bakery
- Hairdresser
- Discount/Gift Store
- Chemist
- Solicitor
- Florist
- Shoe Repairs
- Café/Deli (x2)
- Asian Take-away/Groceries (x3)

The centre consists of a three level structure of reinforced concrete construction with a shopping mall at ground level and parking in the basement and on the roof. It contains a single north-south mall within which is a small internal courtyard. The supermarket occupies most of the eastern side of the centre and the bank enjoys direct access to a major road on the north-west corner. Ten of the specialty stores are located on the western side of the centre (opposite the supermarket), with the remaining three at the end of the eastern boundary.

The general appearance inside the centre is clean but in various parts somewhat dated. Non-structural painted metal arches along the length of the mall contribute to this feeling. The ceiling to the inner courtyard is an exposed suspended grid with ceiling tiles and suspended light fittings.

The finishes include light brown quarry tiles on the floor and a metal strip ceiling with sprinklers and surface mounted light fittings. The painted surfaces are clean and regularly maintained. Public seating facilities include chairs and tables which are approximately 5 years old and despite their

relatively heavy use are in surprisingly good order. The entrance doors are all fully glazed and automatic. The centre is entirely air-conditioned, with the supermarket providing its own separate heating and cooling system.

The shopping centre is located on the south side of a major traffic thoroughfare. It is also immediately opposite a designated 'premier' railway station'. Apart from a small amount of additional retailing in two nearby roads, the area is essentially residential in character.

The centre has 287 car parks of which 128 are located on the roof, 123 are in the basement and a further 36 are at ground level at the southern end of the centre. Parking is usually limited to one hour, mainly to discourage students from using it whilst attending lectures at the adjacent campus. Parking officers regularly patrol the area, and strictly enforce the parking regulations.

DEMOGRAPHICS

Valuing a shopping centre requires consideration and analysis of a number of factors, including the demographics of the shopping centre's trade area. It is important to consider both local population data, which includes factors such as age, sex, income levels, size of household and home ownership versus rental levels, as well as the trade catchment area from which the long-term customers of the centre are drawn.

Population and economic data can help determine the spending habits of customers, and consequently assist in identifying the appropriate retail tenant mix crucial to the success of a shopping centre. An area that has a larger proportion of homeowners versus renters usually signifies greater stability and an overall greater income level. It is also important to recognise that the spending habits of, for example, an aging population, differ from those areas that have a higher percentage of young families with small children, or from a relatively transitory student population.

As mentioned previously the shopping centre is situated in a predominantly residential area. To the north of the centre are quite well established suburbs. There is a high percentage of home ownership by the inhabitants of these suburbs, and their income levels are above average. South of the centre are suburbs whose residents also enjoy relatively high incomes and home ownership levels. To the south-east are suburbs that have a greater concentration of rental properties, especially in the immediate vicinity of the University campus. These properties house a high proportion of university students. These students use the shopping centre extensively during the academic year however patronage of the centre reduces significantly during non-teaching weeks and the long Christmas break.

The trade catchment area is significant in that it is from the primary trade area that 60-70% of sales are derived. The remainder of sales come from what is known as the secondary trade area. For a neighbourhood centre in a metropolitan location, the primary catchment area is probably a radius of 1-2 kilometres from the centre.

It is important to note that adjacent to the shopping centre, within the primary catchment area, is a university campus. This campus has a teaching, administrative and student population of some 8000 people. The majority of these people are students, and as mentioned previously, during the non-teaching weeks of the year when students are not on campus, this impacts quite significantly

on patronage of the centre. Although many of the teaching and administrative staff do not necessarily reside in the primary catchment area they are often observed doing their supermarket shopping before and after work and at lunchtimes. They also frequent the centres café/deli's and takeaway food venues for lunch, as it allows them to get away from the work environment but is within easy access. The on-campus food venue options are limited, and often close down or provide limited service during non-teaching periods.

COMPETITION

The performance of a shopping centre in terms of the rental levels that can be achieved, which directly impacts on future cash flows, is greatly shaped by its competitors, both in terms of the type of competition and the extent of competition. Consideration should be made of any potential new competition that could provide a threat to the existing trade area by drawing customers away. A new development is probably of greater concern for this reason than existing competitors, where the shopping patterns are already probably quite well established. Within the primary trade area of this shopping centre it is unlikely a new shopping centre would be developed in the near future, given the existence of the current competition and the lack of a readily available site. A greater threat to the centres current performance would come through the major re-development and expansion of an existing competitors site.

There are a large number of supermarkets providing competition for the shopping dollar of the centre's primary catchment area residents. In all cases these supermarkets are either located within a shopping centre or adjacent to a local shopping strip, which also provide competition for the specialty stores within the shopping centre.

PLANS FOR FUTURE RE-DEVELOPMENT

Except for minor or cosmetic maintenance the shopping centre has not undergone any major re-furbishment or re-development since its purchase in 1985. (It is noted that the building was constructed prior to the relevant date for building capital allowance. Depreciation benefits have since been exhausted). This also applies to the internal fitout of the anchor tenant, and it is understood that it is now due for a refit, although the extent of this is not known.

The owner of the shopping centre recently announced it had signed with a development group to undertake a feasibility study regarding a major re-development of the existing site. As data relating to the magnitude of the proposal, and accompanying costing and financing scenarios is not available, the potential impact of this re-development has not been taken into consideration in this paper.

THE FUTURE OF SHOPPING CENTRES

Changing demographics including an aging population, more women participating in the workforce and different consumer spending patterns are all issues that shopping centre owners and investors must look into when considering the reliability of future cash flows. Consumers are now spending more on entertainment and leisure activities as well as travel and health services, and this has resulted in less being spent on (for example) fashion. It is therefore extremely important that close attention is given to the appropriate tenant mix, rather than just accepting the highest rental amount

available. As the customer becomes more discerning with their shopping dollar, the owner must endeavour to create an environment that satisfies the requirements of the consumer.

The internal physical environment of a shopping centre has also received a great deal of focus recently, moving towards recreating a village type atmosphere with a community ambience. Large shopping centres are now trying to imitate the smaller more intimate groups of shops by creating a series of themes throughout – for example a fresh food court which people can visit regularly without feeling like they are in a sterile barn-like atmosphere.

Shopping centres are now becoming de facto leisure and entertainment providers, particularly with the current boom in multi-screen theatre complexes evident at most large shopping centres. Greater emphasis is also being given to placing service providers within an area easily accessible to the consumer. For example local government services are now being found in some shopping centres. This allows the often time-poor person to go to one place to do their grocery shopping, as well as complete other necessary household tasks.

Shopping centres are also facing greater competition, and this applies particularly to the use of the Internet as an alternative to the conventional practice of going to a shopping centre/supermarket to do the grocery shopping. It is now very easy to order the family groceries over the Internet and have it home delivered - a great convenience to busy customers. Buying a gift or a book over the Internet is also very simple however it does raise the question of just how different is this to the old-fashioned 'mail order' delivery system? Nevertheless the impact of this type of retail activity on the traditional shopping centre has the potential to be huge. The technology required to use the Internet for shopping is continually improving, allowing more and more people access to this convenient method of shopping. It may take time to expand but given its global reach is likely to have a significant impact on conventional retailing as we now see it.

Despite the huge potential for retailing over the Internet, especially in terms of convenience, there are some issues that need to be considered. For example buying a book or a gift with only a picture or description to go by may present little difficulty, but buying clothing is a different story. The actual experience of trying on clothes, getting the size right etc is not possible to do over the Internet. Many people also enjoy, and some would argue, need, to experience human contact and social interaction, and this is impossible to do over the Internet. By their very nature, most people enjoy contact with others and going out to do the shopping can provide this experience, even at a very basic level. Although it would almost be possible to live entirely within the walls of our home and order everything over the Internet, our need for human interaction, and dislike of isolation probably make this an unrealistic scenario for most of us in the near future.

DATA COLLECTION
In order to carry out a Discounted Cash Flow analysis data relating to the shopping centre, annual income and expense statements were obtained from centre management.

Annual income from each tenancy for the years 1998 and 1999 was obtained from the respective tenancy schedules as at 31 December for each of these years. The anchor tenant pays a base rental plus a percentage rental based on turnover. The specialty store leases are generally either

reviewed to market or CPI over varying time periods. Initial lease periods vary, as do option periods.

Operating expenses for the centre during 1998 were obtained from the audit certificate issued for that year. 1999's actual operating expenses were obtained from the property management system used to record this information, as the audit certificate has not yet been issued. It should be noted that the owner does not pay land tax or municipal rates.

METHODOLOGY

To determine the influence of key variables on shopping centre value, as measured by NPV, a DCF model was constructed. This provides a base scenario against which comparisons can be made. The DCF takes into account rental income, building operating costs and vacancy levels over a 10-year holding period.

The NPV is determined using a discount rate of 12.5% for future clash flows; a rate considered appropriate for this type of investment.[2] The terminal capitalisation rate is assumed to be 11.5%.[3] Three different financial structures were considered; no debt, 2 million dollars debt and 4 million dollars debt. In the two debt scenarios the loans are assumed to be an interest only facility, with a fixed interest rate for the first three years (9%) and an annual variable interest rate for the balance of the 10-year term.

Table 1 provides the base scenario results against which the results from the Monte Carlo simulations can be compared. The base scenario assumes an annual increase in outgoings of 1 percent. Annual turnover is assumed to increase at 5% percent per annum and the loan interest rate varies across the term of the interest only loan in the following manner: years 1-3 @ 9%, years 4-8 @ 10%, and years 9&10 @ 11%.

DEBT LEVEL	NPV
$4 million	$3,219,343
$2 million	$4,907,981
No Debt	$6,596,621

TABLE 1

THE SIMULATION PROCESS

The long-term viability of the centre is closely aligned with the fortunes of the anchor tenant, with the turnover of this tenant playing a key role in the centre's future. If the centre loses a proportion of its customer base due to a trend for online shopping how will this impact on the value of the centre? This question may be examined by simulating turnover for the anchor tenant, since rents are tied to its turnover.

---

[2] Stenhouse M. 1999

[3] Based on the perceived level of risk at the end of the DCF holding period, which coincides with the term certain of the anchor tenants lease

Rent paid by the anchor tenant is established using a base amount plus a percentage of turnover. If the anchor's turnover increases this reflects improving fortunes for the centre as a whole as other tenants benefit from the increased traffic. From the perspective of the owner/lessor, this results in increased rent paid by the supermarket and a lower vacancy rate. The converse is also true but possibly with greater severity. A reduction in the anchor's turnover not only reduces the rent it pays but also adds to the overall risk associated with owning the centre. The other tenants are, to a greater or lesser extent, dependent on the ability of the anchor to generate traffic; hence their viability is much more precarious if there is a drop in centre traffic.

Changes in turnover for the anchor are assumed to follow a uniform distribution in the range -10% to +5%. A 10% reduction in turnover is considered as a worst case scenario over the time horizon being considered. The use of a uniform distribution to model this scenario stems from the belief that we are entering a period of major change where outcomes are difficult to predict, even most likely outcomes. An optimistic view is to assume that past growth rates will continue in the future but that these growth rates will be positive. The scenario postulated here is to take the view that the future will be different to the past and that each possibility has an equally likely chance of occurring.

The flow on of a reduction in the anchor's turnover will have an exponential impact on the centre as a whole. This is captured by making an appropriate allowance for vacancy, refer table 2, and incorporated into the spreadsheet using a lookup function linking percentage change in turnover to specific vacancy costs. A vacancy allowance of $24,000 is representative of two vacant specialty stores.

ANCHOR T/OVER CHANGE	VACANCY COST
-10.0%	$48000
-9.3%	$42500
-8.5%	$35000
-7.8%	$31000
-7.0%	$29500
-6.3%	$28000
-5.5%	$27000
-4.8%	$26500
-4.0%	$26200
-3.3%	$26000
-2.5%	$25800
-1.8%	$25600
-1.0%	$25500
-0.2%	$24000
0.5%	$23000
1.3%	$21000
2.0%	$17000
2.8%	$13000
3.5%	$10000
4.3%	$5000
5.0%	$0

TABLE 2

There are several variables impacting on NPV in addition to turnover, however none are likely to have as a great an impact. Two additional variables are assumed to be random; percentage changes in outgoings from years 3 to 10 are drawn from a uniform distribution in the range 1% to 5%, and the interest rate is assumed to follow a normal distribution with a mean of 10% and a standard deviation of 1.5% after an initial period of 3 years when it is fixed at 9%.

The results of the Monte Carlo simulations at varying debt levels are provided in table 3.

DEBT LEVEL		NUMBER OF SIMULATIONS			
		n=500	n=1000	n=2000	n=5000
$4 million	Minimum	$1,305,526	$1,225,568	$1,157,589	$1,063,154
	Maximum	$2,595,412	$2,715,490	$2,730,553	$3,003,681
	Mean	$1,876,073	$1,861,971	$1,856,295	$1,862,915
	Std. Deviation	$239,870	$247,910	$241,486	$240,719
	Range	$1,289,885	$1,489,921	$1,572,964	$1,940,528
$2 million	Minimum	$3,042,528	$2,946,092	$2,838,442	$2,976,476
	Maximum	$4,418,361	$4,470,663	$4,389,737	$4,563,881
	Mean	$3,602,034	$3,609,102	$3,603,106	$3,603,268
	Std. Deviation	$247,468	$227,963	$241,272	$232,453
	Range	$1,375,834	$1,524,571	$1,551,295	$1,587,405
No Debt	Minimum	$4,722,057	$4,804,253	$4,705,853	$4,666,782
	Maximum	$5,991,636	$6,135,475	$6,245,865	$6,169,126
	Mean	$5,347,012	$5,344,460	$5,335,754	$5,341,846
	Std. Deviation	$228,918	$225,294	$227,730	$228,183
	Range	$1,269,579	$1,331,222	$1,540,012	$1,502,344

<u>TABLE 3</u>

ANALYSIS

The purpose of conducting simulations of increasing magnitude is to look at the consistency of the distribution. It is apparent from table 3 that as the number of simulations increases, the tendency for a consistent minimum and maximum emerges, indicating the minimum and maximum outcomes associated with the assumptions underlying the simulation. The effect of debt is to increase the range between minimum and maximum. Clearly the assumption of an interest rate that is assumed to be a normal random variate, with a standard deviation of 1.5%, will contribute to variability in the NPV when debt levels are high. The risk associated with high debt levels, while not directly quantified here is implicit in the range. This is confirmed by the no debt scenario.

The impact of the interest rate is evident by comparing the different debt levels. When n=500 there range of approximately 1.3 million dollars under each different debt scenario. When the number of simulations approaches 5000 this range decreases as debt decreases.

Comparison of the base scenario with the most optimistic outcome (measured by the maximum) when n=5000 reveals the fallacy of the traditional (single point estimate) approach.

CONCLUSIONS

Monte Carlo simulation is a powerful tool to examine realistic future scenarios. In a changing environment such as we are now facing it is essential to use simulation tools. The analysis of the shopping centre, which is intrinsically linked with the shopping patterns of its customer base, clearly indicates the risk associated with investing in this type of asset.

It is important for current practitioners to consider using simulation tools as an integral part of their analytical framework. Computer technology now allows this to be done readily, and the availability of spreadsheet plug-ins to enhance this type analysis is commonplace. It is now incumbent on educators to introduce these tools to their teaching programs.

A further issue to be quantified in future analysis is to explicitly take into account the risk associated with different levels of debt financing.

BIBLIOGRAPHY

Australian Property Institute, *Professional Practice 2000*, API, Canberra

Bentley C., *Breaking the Mould*, Property Australia, December 1999/January 2000

Blundell L., *Following the Shopping Dollar*, Property Australia, vol 12 no 6, Property Council of Australia, March 1998

Carney S., *Is e-retail capable of taking on the mall?*, The Age, 7 January 2000

Cocks A.T. and partners, *[name of shopping centre] [suburb]**, May 1996

Elliot M., *[name of shopping centre] - Marketing Plan**, 1996

Frankland N., *Woolworths Market Profile Pinpoints its Future in Food*, Foodweek, No 1513, 1999

Honeywill R., *The Evolution of the Shopping Centre 'Who Will Survive?'*, Property Council (Victoria) News, July 1999

Pagliari J.L. ed., *The Handbook of Real Estate Portfolio Management*, Richard D. Irwin Inc., USA, 1995

Parker D., & Robinson J., *A Brief History of the Australian Discounted Cash Flow Practice Standard*, Presented at the World Valuation Congress, Melbourne, April 1999

Property Council of Australia Ltd, *Victoria Shopping Centre Directory*, 1997/1998

Stenhouse M., *Lecture Notes to Assist with the Topic of Shopping Centres*, PR346 Urban Valuations, March 1999

Sirmans C.F. & Guidry K.A., *The Determinants of Shopping Centre Rents*, Journal of Real Estate Research, Vol 8 no 1, p107-116, 1993

Sirmans G.S., Gatzlaff D.H., Diskin B.A., *Suffering the Loss of an Anchor Tenant*, in Benjamin J.D. ed., Megatrends of Real Estate Research, Klewer Academic Publishers, USA, 1996.

Vernor J.D., Rabianski J., *Shopping Center Appraisal and Analysis*, Appraisal Institute, Chicago, 1993

*for commercial reasons the name of the shopping centre from which data was gathered, and its location, have been kept confidential