

OCCASIONAL PAPER

March 2008

investment strategy

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Options Pricing and Property



Key Points

- Options are widely used in both the leasing and sale of commercial property in Australia. Options create both an asset and a liability and should be understood by landlords, tenants, real estate agents and valuers.
- There are generally two types of options used – a “put” and a “call” – which confer rights and obligations upon the parties involved.
- In the leasing market, a landlord may grant an option over commercial floorspace enabling the tenant to expand, contract or renew the space leased.
- In the sales market, an owner may grant an option over commercial or residential premises granting a prospective purchaser the opportunity to buy the property.
- A complicated mathematical formula known as the Black and Scholes model can be modified to accurately price a property option.
- All participants in the property industry can benefit from a better understanding of options pricing. This paper is designed to demonstrate there is a more formal mechanism for assessing the asset and liability which is created when an option is created.

Introduction

Options are widely used in both the leasing and sale of commercial property in Australia. The use of options has implications for landlords, tenants, real estate agents and valuers because the use of options creates both an asset and a liability at the same time. A better understanding of options may one day lead to the creation of a "market" in property options which could be used by property owners and tenants alike. For example, a landlord could offer to the market in general an option over floors where a lease expiry will create a vacancy and this, in turn, would give potential tenants flexibility in planning for their future expansionary requirements - a value-added, win-win situation. This occasional paper is intended to be a starting point in the discussion of the use and valuation of options in the commercial property market in Australia.

What is an option?

An option is a contract between two parties which confers certain rights and obligations upon the two parties regarding the transfer of ownership of an asset. One party is the owner or buyer of the option and they have certain rights whilst the other party is the seller of the option and they have certain obligations. Generally, an option is not a deposit and the price paid for the option is non-refundable.

"Put" and "Call" options

Options are most commonly traded in financial markets where there are generally two types of option - a Put option and a Call option. A Put option gives the buyer the **right** to sell or "put" the asset to the other party whereas a Call option gives the buyer the **right** to buy or "call" the asset from the other party. A Put option gives the seller the **obligation** to buy or "be put" the asset from the other party whereas a Call option gives the seller the **obligation** to sell the asset to or "be called by" the other party. Options are widely used in financial markets to hedge portfolios by effectively increasing or decreasing exposure to the underlying asset or to the financial market in general whether it be the stock market, bond market, currencies or commodities.

The property context

Within the context of property almost all options are Call options. On the leasing side, a landlord may grant a tenant an option over commercial floorspace at some time in the future, on expiry of the existing lease. In effect, the landlord has "sold" a Call option. The tenant (buyer) has the right to exercise the option and extend their lease and the landlord (seller) has the obligation to provide the floorspace. However, the buyer (tenant) presently pays nothing for this right to either extend their lease or leave on lease expiry. One might say the landlord is securing a tenant for the future, but remember the tenant (buyer) does not have to exercise their option. Realistically the property owner has reduced the future opportunities for the building for no compensation. With regard to the sale of property, a property owner may offer to a prospective buyer an option to purchase their property. The property owner has "sold" a Call option and the obligation to deliver the property, whereas the prospective purchaser has "bought" the option and has the right to buy the property. As with the leasing option, it appears the property owner is committed to a future sale, with no potential for financial compensation should the option remain unexercised, as no money has been paid for the option.

How, then, should the options for property be priced?

The pricing model

In the early 1970's two American academics - Fisher Black and Myron Scholes - improved upon a mathematical model and created what is now regarded as a most accurate option-pricing model. The model is known after its creators as the Black and Scholes Model and is widely used in financial markets for pricing financial instruments - primarily options.

The model - or mathematical equation - is calculated thus:

$$C = SN(d_1) - Ke^{-rt}N(d_2)$$

where:

C = Theoretical option premium

S = Current asset price

t = Time to expiry of option

K = option exercise price

r = risk-free interest rate (10 year bond)

N = Cumulative standard normal distribution

e = exponential function (2.7183)

$$d_1 = \frac{\ln(S/K) + (r + \sigma^2/2)t}{\sigma\sqrt{t}}$$

$d_2 = d_1 - \sigma\sqrt{t}$ where:

ln = natural logarithm

σ = standard deviation of returns (volatility)

This model can be easily applied to financial markets such as the sharemarket where the price today and a price in the future (the exercise price) can be set.

Adapting the model for property

The model as it currently exists needs only minor modification to adapt it to property. The major change involves the risk free interest rate (or 10-year bond rate). In financial markets, where options can be used as a proxy for owning shares, currencies, commodities or bonds, the time value of the money saved less any dividends or interest foregone is an important aspect of valuing the option. This issue does not have any bearing in a property leasing scenario as the lessee does not acquire an asset upon exercise of the option however it does have a bearing in a property purchase situation.

Applicable situations may be a deposit prior to construction or first right of refusal. It is not applicable where the purchase is conditional. For example, a purchase contingent on planning approvals, finance approval or the sale of another property. The model also requires modification in the situation where an option can be exercised at any time rather than on a fixed date. Further modification is required should the option holder forgo income in the form of rent over the option period.

Leasing scenarios

Let's assume the property market accepts the case for paying for options. After all the landlord is saying to the tenant 'You can have the property for another X years when you exercise your option in Y years time' - the signed lease tying the owner to the agreement, even if a better tenant comes along. The tenant says, "Thanks, I'll let you know". The benefit is tilted towards the tenant and not the landlord.

Using the pricing model what price should a tenant be paying for the option of continuance of lease?

In adapting the Black and Scholes Model for pricing options in property leasing we rename some of the variables thus:

S = current rent

K = market, or predetermined, rent at lease expiry

r = 0.00

σ = IPD/PCA Investment Performance Index Returns Volatility

(See Table 2)

I have an office floor of 1,000 square metres and I have a tenant prepared to sign a lease for seven years with a seven-year option. Current market rent for office space is \$400 per square metre, market rent in seven years is projected to be \$540 per square metre, volatility for office property (See Table 2) is 7.61% and we know the time to option expiry. In placing these variables into the model it calculates the option to have a value of \$2.80 per square metre or \$2,800 for the 1,000 square metres.

I have an industrial warehouse of 10,000 square metres and I have a tenant prepared to sign a lease for five years with a five-year option. Current market rent for warehouse space is \$75 per square metre, market rent in five years is projected to be \$90 per square metre, volatility for industrial property (See Table 2) is 4.24% and we know the time to option expiry. In placing these variables into the model it calculates the option to have a value of \$0.25 per square metre or \$2,500 for the 10,000 square metres.

I have retail floorspace of 100 square metres and I have a tenant prepared to sign a lease for three years with a three-year option. Current market rent for retail space is \$700 per square metre, market rent in three years is projected to be \$765 per square metre, volatility for retail property (See Table 2) is 3.66% and we know the time to option expiry. In placing these variables into the model it calculates the option to have a value of \$1.70 per square metre or \$170 for the 100 square metres.

In a leasing scenario, the fact the landlord is not granting a cheap proxy into an asset (and therefore no need to apply the 10-year bond rate to account for money saved) means the options are significantly devalued.

In some instances, options to lease can devalue a property by providing a degree of inflexibility to the property. For example, a multi-storey office building partially let to tenants with long dated options provides less flexibility to a prospective purchaser unless they are able to purchase the options. The purchase of the options requires the options are valued and the cost is then added to the purchase price of the building. The situation may preclude conversion to alternative use and may dissuade owner-occupiers from purchase, again unless the options can be purchased. Clearly, this situation can significantly limit the value of the property by affecting its saleability, particularly when it is only partially let.

Sale scenarios

In adapting the Black and Scholes Model for pricing options in property purchase we rename some of the variables thus:

S = current purchase price

K = purchase price at expiry (or less deposit)

r = 10 year bond rate

σ = IPD/PCA Investment Performance Index Returns Volatility

(See Table 2)

When an option is granted to purchase a property at some point in the future, it is far from worthless. Again, some examples are in order. I have agreed to purchase an apartment upon completion in two years time for a price of \$300,000 by making a deposit today of 5% or \$15,000 which is deductible from the purchase price. I am not required to make progress payments therefore my end price will be \$285,000. I can elect not to purchase the apartment by forfeiture of my deposit. The developer may pursue me legally for the balance of the settlement. Nevertheless, for all intents and purposes, my initial deposit is in fact an option to purchase. Is the \$15,000 fair value?

Our apartment price of \$300,000 with a purchase price of \$285,000 in two years with a 10-year bond rate of 6% and a volatility of 6.36% would yield an option price of \$47,000. That is the true worth of the \$15,000 deposit. Why?

The \$285,000 required to complete the purchase either sits in the bank at 6% per annum earning money at this rate or it exists in an undrawn line of credit or mortgage facility which saves the borrower 7.5% per annum in interest payments for two years. Between paying the deposit and settlement of the property, the owner might transfer ownership and make a tidy profit. For example, using the scenario above, if after one year the apartment can be sold for \$330,000 with completion still one year away the option would be valued at \$63,000 and I can certainly walk away with \$45,000 having generated a 200% return on equity.

In another example, a tenant is given a seven-year lease with an option to purchase a 2,570 square metre industrial facility at market value (assessed by two valuers) within the first four years of the lease. The tenant pays a market rent of \$70 per square metre with fixed escalations of 3% per annum. The property would sell today on a yield of 7.5% and in four years time on a yield of 8%.

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	TODAY	FOUR YEARS TIME
Building size	2,570 sqm	2,570 sqm
Rent per square metre	\$70	\$79
Income	\$180,000	\$200,000
Initial yield	7.5%	8%
Building value	\$2,400,000	\$2,500,000
Option value	\$55,000	\$0
Adjusted building value	\$2,345,000	\$2,500,000
Adjusted yield	7.7%	

The freehold value of the property is now encumbered by the threat of the exercise of the option within four years. (ie. acquisition costs cannot be spread over a sufficient period without lowering returns). Also, in a buoyant market, the two valuer assessments of the value of the property may be below what is achievable at auction. The option clearly has a value and the value of the option should be subtracted from the value of the property.

Conclusion

The use of options is widespread in the commercial property industry. Options are often given away as inducements with little or no consideration given to their effect on the value of the asset. Options do have a value and there is a model for valuing them. Options can be a useful tool for both owners and occupiers of property particularly if their use is better understood and promoted throughout the industry. Landlords in particular could, and should, make better use of options by offering them into a secondary market where either sitting tenants, or prospective tenants, could avail themselves of the option to lease space at a date in the future. In fact, landlords should offer options on all commercial space, first to their sitting tenants and if not purchased, into a secondary market. Indeed we could see this secondary market attracting speculators who take up lease options on property, gambling on the future market availability. This situation could occur at the bottom of the rental market, where some tenants lease more space than required at low rentals hoping at a later date to profit rent from sub leasing the excess space. To the landlord, this generates more income from the property and can alleviate some of the risk associated with lease expiries. To tenants, the widespread use of options can offer better forward planning mechanisms for occupancy.

Valuers too can benefit from a better understanding of options pricing. Presently valuers have no formal mechanism for valuing options and no formal mechanism for assessing the liability which is created by options other than their own "interpretation". I hope this paper highlights the approach to options needs more sophistication than just 'interpretation'.

VOLATILITY NUMBERS (TOTAL RETURNS DEC 1984 – JUN 2006)

Market	Volatility (%pa)
All Ordinaries	14.71
Listed Property Trusts	10.39
Bonds (all series, all maturities)	6.36
Australian Composite Property	6.13
Australian Office	7.61
Australian Industrial	5.24
Australian Retail	3.66

Source: IPD/PCA Investment Performance Index

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