CBA Global Markets Research

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Abstract

This is a LaTeX writeup of my progression through a preponderance of alternative hedging strategies

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Contents

List of Tables

List of Algorithms

1 Case Brief

1.1 Problem Statement

You and your colleagues work in the Commonwealth Bank of Australia's Global Markets team. Your role is to help clients to navigate their financial market risks. Your client, Prime Property Trust (PPT), is concerned with the potential impact that movements in financial markets may have on their operations. The Treasury team at Prime Property Trust are particularly concerned about interest rate market movements and how it may impact their ability to meet budgeted cost obligations over the next year. The Treasury team wants to know:

1. Your view on inflation and the RBA cash rate and; how this will affect Australian interest rates.

2. The impact of variable interest rates to their business operations and cash flows; and

3. Financial market instruments that may be appropriate to manage these risks.

1.2 Background

Prime Property Trust is an Australian Real Estate Investment Trust (REIT) that manages and invests in a diverse range of property types, including office buildings and retail centres. Prime Property Trust primarily funds its assets with floating rate debt. Prime Property Trust has just announced two new assets to be added to the portfolio:

1. Price Corporate Tower (PCT) | | Facility tenor: 3 years | Size of facility: $100m | Interest rate: 3-month BBSY+1.20%

2. Sterling Square (SS) | Facility tenor: 5 years | Size of facility: $200m | Interest rate: 3-month BBSY+1.50%

Prime Corporate Tower (PCT) will generate immediate returns and be fully operational from Day 1. Sterling Square (SS) will commence construction Day 1 and be fully operational from FY27 onwards. Assume the PCT facility is refinanced at the end of the 3-year tenor.

The interest rate on the loan facilities are above and calculated at the beginning of each quarter. Additionally, Prime Property Trust must maintain an Interest Coverage Ratio (ICR) greater than 1.75x at all times or risk breaching the terms of the loan and have its funding withdrawn. Prime Property Trust's cost base and projected revenue for the upcoming financial year is provided on the following page.

1.2.1 Cost Base and Projected Revenue

Prime Property Trust - Income Statement

All figures in 000's

Item	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32	FY33
Rental Income										
Retail Rent	5,850	7,116	7,289	20,057	18,542	17,126	14,496	13,046	14,095	14,971
Office Rent	3,978	2,901	2,469	5,821	7,564	9,265	12,137	14,083	14,768	13,852
Total Rental Income	9,828	10,017	9,758	25,878	26,106	26,391	26,633	27,129	28,863	28,823
Less Vacancy Factor	-	-	-	-	-	-	-	-	-	-
Less Repairs & Maintenance	1,047	1,078	1,176	1,232	1,309	1,424	1,518	1,607	1,760	1,925
Less Management Fee	349	527	579	411	436	361	394	536	587	642
Less Outgoings Paid	-	-	-	-	-	-	-	-	-	-
Net Rentals (EBITDA)	**8,432**	**8,412**	**8,003**	**24,235**	**24,361**	**24,606**	**24,721**	**24,986**	**26,516**	**26,256**
Base Case										
BBSY (%)	3.70%	3.75%	3.49%	3.36%	3.40%	3.49%	3.59%	3.71%	3.82%	3.92%

(Source: Prime Property Trust Income Statement; Assume ICR = EBITDA / Interest Expense)

2 Secular Economic Variables Analysis

2.1 Equilibrium and Dynamic Relationships

2.1.1 Mathematical Construction

The empirical analysis of multiple financial time series frequently encounters non-stationarity, often attributable to the presence of unit roots, which cause shocks to have persistent effects on the levels of the variables (Nelson and Plosser, 1982). A variable y_t contains a unit root if its characteristic autoregressive polynomial $\phi(L)$ (where L is the lag operator in $\phi(L)y_t =$ deterministic terms $+ u_t$) has a root $z = 1$, implying $\phi(1) = 0$ (Fuller, 1976). Such $I(1)$ processes exhibit infinite variance and no tendency towards a mean or deterministic trend. Standard regression inference is invalid for $I(1)$ variables unless they are cointegrated due to the risk of spurious regression (Granger and Newbold, 1974). Thus, preliminary unit root testing, using procedures like the Augmented Dickey-Fuller (ADF) tests (Dickey and Fuller, 1979; Dickey and Fuller, 1981), is essential to ascertain the order of integration.

If a $k \times 1$ vector of $I(1)$ variables Y_t possesses a linear combination $\beta' Y_t$ that is stationary, $I(0)$, the variables are cointegrated, with β being the cointegrating vector (Engle and Granger, 1987). The relationship $\beta' Y_t =$ constant defines a long-run equilibrium. The joint dynamics of such cointegrated systems are captured by a Vector Error Correction Model (VECM), a restricted Vector Autoregression (VAR) (Sims, 1980).

A VAR model of order p, VAR(p), is given by Equation 1:

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \cdots + A_p Y_{t-p} + \mu + \varepsilon_t \tag{1}$$

where A_i are $k \times k$ coefficient matrices, μ contains deterministic terms, and ε_t is $k \times 1$ white noise with $E(\varepsilon_t) = 0$ and covariance Σ_ε. This VAR(p) is reparameterized into its VECM form (Lütkepohl, 1991; Kitamura, 1998):

$$\Delta Y_t = \Pi Y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-i} + \mu + \varepsilon_t \tag{2}$$

Here, Δ is the first difference operator, $\Pi = -\left(I - \sum_{i=1}^{p} A_i\right)$ is the long-run impact matrix, and $\Gamma_i = -\sum_{j=i+1}^{p} A_j$ capture short-run dynamics. The Granger Representation Theorem (Engle and Granger, 1987) dictates that for cointegrated variables, Π has reduced rank r $(0 < r < k)$ and can be factored as $\Pi = \alpha\beta'$ (Equation 3):

$$\Pi = \alpha\beta' \tag{3}$$

The $k \times r$ matrix β contains r cointegrating vectors defining long-run equilibria; $\beta' Y_{t-1}$ represents stationary deviations from these equilibria (Johansen, 1991). The $k \times r$ matrix α contains adjustment coefficients, α_{ij} measuring the speed at which variable i responds to disequilibrium in the j-th cointegrating relationship. This yields the VECM:

$$\Delta Y_t = \alpha(\beta' Y_{t-1}) + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-i} + \mu + \varepsilon_t \tag{4}$$

The term $\alpha(\beta' Y_{t-1})$ is the error correction mechanism. The Johansen procedure (Johansen, 1988; Johansen, 1991; Kitamura, 1998) provides a maximum likelihood framework for determining r and estimating VECM parameters.

Dynamic shock propagation is analyzed using Impulse Response Functions (IRFs), which trace the effects of a one-time shock in ε_t on Y_t (Hamilton, 1994; Lütkepohl, 1991). IRFs are derived from the Vector Moving Average (VMA(∞)) representation of the levels VAR (Equation 1), assuming $\mu = 0$:

$$Y_t = \sum_{s=0}^{\infty} \Phi_s \varepsilon_{t-s} \tag{5}$$

where $\Phi_0 = I_k$, and Φ_s are $k \times k$ impulse response matrices, computable recursively or via the VAR(1) companion form (Equation 6):

$$\mathbf{Y}_t = \mathbf{A}\mathbf{Y}_{t-1} + \mathbf{E}_t \tag{6}$$

where $\mathbf{Y}_t$ is a $kp \times 1$ stack of $Y_t, \ldots, Y_{t-p+1}$, $\mathbf{A}$ is the $kp \times kp$ companion matrix, and $\Phi_s = J\mathbf{A}^s J'$, with $J = [I_k, 0, \ldots, 0]$ being a $k \times kp$ selection matrix (Lütkepohl, 1991).

For structural interpretation, VAR residuals ε_t, typically contemporaneously correlated (non-diagonal Σ_ε), are orthogonalized into structural shocks u_t. The Cholesky decomposition of $\widehat{\Sigma}_\varepsilon = \widehat{P}\widehat{P}'$ (with $\widehat{P}$ lower triangular) yields $u_t = \widehat{P}^{-1}\varepsilon_t$. Structural IRFs are then $\Theta_s = \Phi_s \widehat{P}$ (Sims, 1980; Lütkepohl, 1991). This identification is ordering-dependent. In a VECM, these IRFs show dynamic adjustment towards the equilibria defined by β at speeds governed by α.

2.2 Stochastic Differential Equations (SDEs)

2.2.1 Geometric Brownian Motioon (GBM)

2.2.2 Chan-Karolyi-Longstaff-Sanders process (CKLS)

3 Hedging Objectives

Prime Property Trust's (PPT) foremost hedging objective, in response to its new $300 million floating-rate debt facilities benchmarked to the 3-month BBSY, is the maintenance of its debt covenants. Specifically, PPT must ensure its Interest Coverage Ratio (ICR) remains above 1.75x at all times to avoid a covenant breach and the potential withdrawal of funding. Given that projected FY25 financials indicate a pro-forma ICR substantially below this threshold even under base-case BBSY assumptions, strategies that stabilise or reduce interest expense are paramount to mitigate this critical financial distress risk (Smith and Stulz, 1985). This defensive posture aims to preserve financial stability and access to capital markets.

A concurrent primary objective, directly articulated by PPT's Treasury team, is to achieve budgetary stability and control over financing costs, particularly concerning their "ability to meet budgeted cost obligations over the next year". By hedging its exposure to volatile 3-month BBSY movements, PPT seeks to transform unpredictable floating-rate interest expenses into more predictable outlays. This enhanced certainty in debt servicing costs facilitates more reliable financial planning, forecasting, and protection of operating cash flows, which is crucial for sustaining operations, funding ongoing developments such as Sterling Square, and aligning with the general expectation for REITs to deliver stable income streams to investors (Froot et al., 1993).

4 Interest Rate Derivatives Valuation

4.1 Forward Rate Agreements (FRAs)

4.1.1 Notation

- t: The current time (valuation date).
- N_V: The notional principal amount of the FRA.
- R_{FRA}: The annualised fixed interest rate agreed upon at the inception of the FRA contract. This is the "FRA rate."
- T_0: The settlement date of the FRA. This is the date on which the reference rate is determined, and the cash settlement occurs, and it marks the *beginning* of the interest period covered by the FRA. ($t \leqslant T_0$).
- T_1: The maturity date of the interest period covered by the FRA. ($T_1 > T_0$).
- τ: The day-count fraction for the interest period $[T_0, T_1]$, calculated as $(T_1 - T_0)$ in years according to the relevant market convention (e.g., Actual/365). For 3 months, $\tau \approx 0.25$.
- $L(T_0, T_1)$: The annualised floating market reference rate (e.g., 3-month BBSY) observed at time T_0 for the period $[T_0, T_1]$. This is the "settlement rate" or "fixing rate."
- $Z(t, T')$: The risk-free discount factor at the current time t for a unit of currency payable at a future date T'.

4.1.2 Payoff Computation

The FRA is cash-settled at time T_0. The party that effectively agreed to "pay" R_{FRA} and "receive" $L(T_0, T_1)$ (i.e., a borrower hedging against rising rates or an FRA buyer) receives a net payment if $L(T_0, T_1) > R_{FRA}$, and makes a net payment if $L(T_0, T_1) < R_{FRA}$.

The settlement amount, $C(T_0)$, paid to the FRA buyer at time T_0 is calculated as the present value (at T_0, discounted over the period τ using the settlement rate $L(T_0, T_1)$) of the interest differential on the notional principal:

$$C(T_0) = N_V \cdot \frac{(L(T_0, T_1) - R_{FRA}) \cdot \tau}{1 + L(T_0, T_1) \cdot \tau} \tag{7}$$

This discounting reflects that the interest payment on an actual loan for the period $[T_0, T_1]$ would typically occur at T_1, whereas the FRA settles at T_0. Thus, the party receiving a positive settlement at T_0 can invest it at $L(T_0, T_1)$ to realise the full interest differential at T_1.

4.1.3 Pricing

An FRA is a forward contract, and its "price" (the agreed fixed rate R_{FRA}) is set at inception ($t = 0$) such that the initial value of the contract is zero to both parties. This is achieved by setting R_{FRA} equal to the implied simple forward interest rate derived from the current term structure of risk-free zero-coupon rates.

Let:

- $r(0, T_0)$: The annualized simple risk-free spot interest rate at time $t = 0$ for the period of length T_0 (from 0 to T_0).
- $r(0, T_1)$: The annualized simple risk-free spot interest rate at time $t = 0$ for the period of length T_1 (from 0 to T_1).

- τ_0: The year fraction from 0 to T_0.
- τ_1: The year fraction from 0 to T_1.
- $\tau = \tau_1 - \tau_0$: The year fraction of the FRA period itself (from T_0 to T_1).

The no-arbitrage condition implies that the return from investing for the period τ_1 at $r(0, T_1)$ must be equivalent to investing for τ_0 at $r(0, T_0)$ and then reinvesting for the forward period τ at R_{FRA}:

$$(1 + r(0, T_1) \cdot \tau_1) = (1 + r(0, T_0) \cdot \tau_0) \cdot (1 + R_{FRA} \cdot \tau) \tag{8}$$

Solving for R_{FRA}:

$$R_{FRA} = \left(\frac{1 + r(0, T_1) \cdot \tau_1}{1 + r(0, T_0) \cdot \tau_0} - 1 \right) \frac{1}{\tau} \tag{9}$$

This R_{FRA} is the compounded forward rate that ensures the FRA has zero value at initiation. The spot rates $r(0, T_0)$ and $r(0, T_1)$ are derived from the current zero-coupon yield curve, which is typically bootstrapped from observable market instruments (e.g., cash rates, bank bill futures, and interest rate swaps).

Alternatively, using continuously compounded spot rates $r_c(0, T_0)$ and $r_c(0, T_1)$, the continuously compounded forward rate $R_{FRA,c}$ for the period $[T_0, T_1]$ is:

$$R_{FRA,c} = \frac{r_c(0, T_1)T_1 - r_c(0, T_0)T_0}{T_1 - T_0} \tag{10}$$

This $R_{FRA,c}$ would need to be converted to a simple interest equivalent using the appropriate day-count convention to align with the market quotation for R_{FRA}.

The valuation of an existing FRA at any time t (where $0 < t < T_0$) would involve calculating the present value (at t) of the expected settlement at T_0, using the currently implied forward rate for the period $[T_0, T_1]$ and the original R_{FRA}. Specifically, using Equation 7, replace $L(T_0, T_1)$ with the current forward rate $F(t; T_0, T_1)$ and discount the resulting expected settlement from T_0 back to t:

$$V_{FRA,buyer}(t) = \left(N_V \cdot \frac{(F(t; T_0, T_1) - R_{FRA}) \cdot \tau}{1 + F(t; T_0, T_1) \cdot \tau} \right) \cdot Z(t, T_0) \tag{11}$$

4.2 BAB Futures

4.2.1 Notation

- t: Current time (valuation date).
- T_e: Expiry date of the futures contract. This is also the date the reference rate (3-month BBSY) is fixed for the underlying notional 90-day period.
- T_m: Maturity date of the notional 90-day bank bill underlying the futures contract (i.e., $T_m \approx T_e + \tau$, where τ is the day-count fraction for the 90 days).
- $P_F(t, T_e)$: The price of the BAB future at time t for a contract expiring at T_e.
- $Y_F(t, T_e)$: The annualized yield implied by the futures price $P_F(t, T_e)$. The relationship is:
$$P_F(t, T_e) = 100 - Y_F(t, T_e) \tag{12}$$
- $L(T_e, T_m)$: The actual 3-month Bank Bill Swap Rate (BBSY) observed at time T_e, applicable for the period $[T_e, T_m]$. This is the final settlement rate for the futures contract.
- N_V: The actual face value of one BAB futures contract is AUD 1,000,000.
- τ: The day-count fraction for the 90 days of the underlying notional bill, typically 90/365 in the Australian market.
- $Z(t, T')$: The risk-free discount factor at time t for a cash flow at time T'.

The dollar value of a one basis point (0.01%) change in the yield (tick value, TV) for one contract is approximately:
$$TV \approx N_V \cdot 0.0001 \cdot \tau \tag{13}$$
For $N_V = \$1,000,000$ and $\tau = 90/365$, $TV \approx \$1,000,000 \cdot 0.0001 \cdot (90/365) \approx \$24.6575$. The contracts are cash-settled at expiry (T_e) against the 3-month BBSY.

4.2.2 Payoff Computation

The profit or loss (P&L) for a BAB futures position at expiry (T_e) is determined by the difference between the initial contract price (or yield) and the final settlement price (or yield), scaled by the contract's value per index point. The final settlement yield is $L(T_e, T_m)$.

Let $Y_{F,entry}$ be the yield at which a futures contract was initially entered (bought or sold).

A long position profits if the futures price rises, corresponding to a fall in yields.

$$\begin{aligned}
\text{P\&L}_{\text{long}} &= (P_{F,settle} - P_{F,entry}) \cdot \frac{TV}{0.01} && (14)\\
&= ((100 - L(T_e, T_m)) - (100 - Y_{F,entry})) \cdot \frac{N_V \cdot \tau}{0.01} \cdot 0.0001 \\
&= (Y_{F,entry} - L(T_e, T_m)) \cdot N_V \cdot \tau && (15)
\end{aligned}$$

Thus, a long position profits if the actual settlement yield $L(T_e, T_m)$ is *lower* than the initial futures yield $Y_{F,entry}$.

A short position profits if the futures price falls, corresponding to a yield rise. This is the relevant position for an entity like PPT hedging against rising borrowing costs.

$$\begin{aligned}
\text{P\&L}_{\text{short}} &= (P_{F,entry} - P_{F,settle}) \cdot \frac{TV}{0.01} && (16)\\
&= ((100 - Y_{F,entry}) - (100 - L(T_e, T_m))) \cdot \frac{N_V \cdot \tau}{0.01} \cdot 0.0001 \\
&= (L(T_e, T_m) - Y_{F,entry}) \cdot N_V \cdot \tau && (17)
\end{aligned}$$

Thus, a short position profits if the actual settlement yield $L(T_e, T_m)$ is *higher* than the initial futures yield $Y_{F,entry}$.

4.2.3 Pricing

The theoretical price of a futures contract, $P_F(t, T_e)$, and its implied yield, $Y_F(t, T_e)$, are determined by the no-arbitrage principle. The futures yield should closely reflect the implied forward interest rate for the 90 days $[T_e, T_m]$ as seen from the current time t. This forward rate is derived from the existing risk-free zero-coupon yield curve.

Let $r(t, T')$ denote the continuously compounded risk-free spot rate at time t for maturity T'. The continuously compounded forward rate $f(t, T_e^*, T_m^*)$ for the period between T_e^* and T_m^* (where these are times from t) is:

$$f(t, T_e^*, T_m^*) = \frac{r(t, T_m^*)T_m^* - r(t, T_e^*)T_e^*}{T_m^* - T_e^*} \tag{18}$$

This forward rate, $f(t, T_e^*, T_m^*)$, once converted to the appropriate simple interest and day-count convention (Actual/365 for BBSY), forms the primary basis for the futures yield $Y_F(t, T_e)$. The zero-coupon rates $r(t, T')$ are typically bootstrapped from observable market instruments like cash BBSW rates, other BAB futures, and AUD Interest Rate Swaps.

A subtle theoretical distinction exists between forward and futures rates due to the daily mark-to-market feature of futures contracts. A convexity adjustment is necessary if interest rates are stochastic and correlated with futures prices. The approximate relationship is:

$$Y_{\text{futures}} \approx Y_{\text{forward}} - \frac{1}{2}\sigma_r^2 T_e^* (T_m^* - T_e^*) \tag{19}$$

where Y_{forward} is the compounded forward rate implied by the yield curve, and σ_r is the instantaneous short-term interest rate volatility. For short-term interest rate (STIR) futures like 90-Day BABs, this adjustment is generally small and often disregarded in less complex pricing models, leading to the common approximation $Y_F(t, T_e) \approx Y_{\text{forward}}(t; T_e, T_m)$.

The value of an established futures position prior to expiry (at time $t < T_e$), entered at $Y_{F,entry}$, continuously accrues value reflected in daily margin account settlements. The theoretical value of the commitment, separate from accumulated cash P&L, can be expressed as the discounted expected difference between the original contract yield and the current futures yield for the same expiry: For a short position:

$$V_{\text{short}}(t) \approx N_V \cdot (Y_{F,current}(t, T_e) - Y_{F,entry}) \cdot \tau \cdot Z(t, T_e) \tag{20}$$

This indicates that if current market expectations for the future BBSY (reflected in $Y_{F,current}$) have increased above the yield at which the futures were sold ($Y_{F,entry}$), the short position has accrued a positive unrealised value. This valuation framework underscores the market's continuous reassessment of expected future interest rates, against which the BAB futures contract provides a mechanism for price discovery and risk transfer.

4.3 Interest Rate Swaps

4.3.1 Notation

- t: The current time (valuation date).
- N_V: The notional principal amount of the swap, constant for plain vanilla swaps.
- R_{FIX}: The annualised fixed interest rate agreed upon at the swap's inception.
- $L(T_{k-1}, T_k)$: The annualised floating market reference rate (e.g., 3-month BBSY) determined (set or fixed) at time T_{k-1} (the reset date for period k) and applicable for the interest accrual period $[T_{k-1}, T_k]$.
- $T_0, T_1, \ldots, T_M$: The sequence of pre-agreed dates where T_0 is the effective (start) date of the swap, T_M is the maturity (termination) date, and $T_1, \ldots, T_M$ are the payment dates. For the floating leg, $T_0, T_1, \ldots, T_{M-1}$ are typically the reset dates for the subsequent period's floating rate.
- τ_k: The day-count fraction for the k^{th} interest period, covering the interval $[T_{k-1}, T_k]$. This is calculated based on the applicable day-count convention (e.g., Actual/365). For instance, for quarterly payments, $\tau_k \approx 0.25$.
- $Z(t, T_k)$: The risk-free discount factor at the current time t for a unit of currency payable at a future date T_k. These are derived from the prevailing zero-coupon yield curve.

On each payment date T_k (for $k = 1, \ldots, M$), the gross cash flows before netting are:

- Fixed Leg Payment (by the fixed-rate payer):

$$C_{FIX,k} = N_V \cdot R_{FIX} \cdot \tau_k \tag{21}$$

- Floating Leg Payment (by the floating-rate payer):

$$C_{FLOAT,k} = N_V \cdot L(T_{k-1}, T_k) \cdot \tau_k \tag{22}$$

Market practice typically involves netting these payments on each T_k.

4.3.2 Payoff Computation

Consider a counterparty who enters a payer swap (pays R_{FIX}, receives floating rate L). For each interest period k (from T_{k-1} to T_k), the net cash flow, NetSettle_k, received by this fixed-rate payer at time T_k is:

$$\text{NetSettle}_k = C_{FLOAT,k} - C_{FIX,k} = N_V \cdot (L(T_{k-1}, T_k) - R_{FIX}) \cdot \tau_k \tag{23}$$

If $L(T_{k-1}, T_k) > R_{FIX}$, the fixed-rate payer receives a net payment. If $L(T_{k-1}, T_k) < R_{FIX}$, the fixed-rate payer makes a net payment. The economic value of the swap at any time is the sum of the present values of all such expected net settlements.

4.3.3 Pricing

The "price" of an interest rate swap at its inception ($t = 0$) is the specific fixed rate, R_{FIX} (the par swap rate), which ensures the swap has an initial market value of zero to both counterparties. This rate is derived from the no-arbitrage condition that the present value (PV) of the fixed leg payments must equal the PV of the expected floating leg payments.

The fixed leg of the swap, comprising payments of $N_V \cdot R_{FIX} \cdot \tau_k$ at each T_k, is equivalent to the cash flows from a fixed-coupon bond. Its present value at time $t = 0$ is:

$$PV_{FIX}(0) = \sum_{k=1}^{M}(N_V \cdot R_{FIX} \cdot \tau_k) \cdot Z(0, T_k) = N_V \cdot R_{FIX} \cdot \sum_{k=1}^{M} \tau_k Z(0, T_k) \tag{24}$$

The term $A(0, T_M) = \sum_{k=1}^{M} \tau_k Z(0, T_k)$ is the present value of an annuity paying 1 unit of currency per annum in instalments of τ_k for M periods, discounted using the zero-coupon yield curve.

The floating leg consists of payments $C_{FLOAT,k} = N_V \cdot L(T_{k-1}, T_k) \cdot \tau_k$. The future rates $L(T_{k-1}, T_k)$ are unknown at $t = 0$ (except for the first period if $T_0 = 0$ and the rate is already set). To value this leg, the unknown future floating rates are replaced by the implied forward rates $F(0; T_{k-1}, T_k)$ derived from the current ($t = 0$) zero-coupon yield curve. The present value of these expected floating coupons is:

$$PV_{FLOAT}(0)_{\text{coupons}} = \sum_{k=1}^{M}(N_V \cdot F(0; T_{k-1}, T_k) \cdot \tau_k) \cdot Z(0, T_k) \tag{25}$$

A fundamental result in fixed income valuation, based on no-arbitrage, is that a floating-rate note (FRN) that pays the market reference rate L (consistent with the discount curve used for $Z(0, T_k)$) and resets its coupon at each period is valued at its par value (N_V) immediately after each coupon payment, and thus also at $t = 0$ if the first coupon is set based on current market rates. Considering a conceptual final exchange of notional N_V at T_M for the floating leg, its total present value (coupons + principal) at $t = 0$ would be N_V. Therefore, the present value of *only the stream of floating coupons* is:

$$PV_{FLOAT}(0)_{\text{coupons only}} = N_V \cdot (1 - Z(0, T_M)) \tag{26}$$

This widely accepted valuation for the floating leg of a par swap assumes that notional principals are not explicitly exchanged at maturity under the swap agreement itself, or if they are considered for valuation consistency (viewing each leg as a bond), they offset.

For the swap to have zero initial value, the present values of the two legs must be equal: $PV_{FIX}(0) = PV_{FLOAT}(0)_{\text{coupons only}}$. Substituting from Equations 24 and 26:

$$N_V \cdot R_{FIX} \cdot \sum_{k=1}^{M} \tau_k Z(0, T_k) = N_V(1 - Z(0, T_M)) \tag{27}$$

Solving for the par swap rate R_{FIX}:

$$R_{FIX} = \frac{1 - Z(0, T_M)}{\sum_{k=1}^{M} \tau_k Z(0, T_k)} = \frac{1 - Z(0, T_M)}{A(0, T_M)} \tag{28}$$

The discount factors $Z(0, T_k)$ are derived from the current risk-free (or appropriate interbank, e.g., BBSW-based) zero-coupon yield curve. This curve is typically constructed using bootstrapping techniques from liquid market instruments such as cash deposit rates, Bank Bill Futures prices, and existing par interest rate swap quotes for various tenors.

At any subsequent time t during the life of an existing swap (which was initiated with a fixed rate $R_{FIX,orig}$), its market value to the fixed-rate payer is the present value of the remaining expected net cash flows:

$$V_{SWAP,payer}(t) = PV_{FLOAT,remaining}(t) - PV_{FIX,remaining}(t) \tag{29}$$

Here, $PV_{FIX,remaining}(t) = N_V \cdot R_{FIX,orig} \cdot \sum_{j=k}^{M} \tau_j Z(t, T_j)$ (where the sum is over remaining fixed payments from the next payment date T_k, and $Z(t, T_j)$ are current discount factors). Similarly, $PV_{FLOAT,remaining}(t)$ is the present value of the remaining expected floating payments, where future unknown floating rates $L(T_{j-1}, T_j)$ are substituted with current forward rates $F(t; T_{j-1}, T_j)$ derived from the yield curve at time t, and then discounted using $Z(t, T_j)$. A common alternative valuation expresses the swap's value by comparing its original fixed rate to the current market swap rate for the remaining tenor:

$$V_{SWAP,payer}(t) \approx N_V \cdot (R_{FIX,current}(t, T_M) - R_{FIX,orig}) \cdot A(t, T_{M,remaining}) \tag{30}$$

where $R_{FIX,current}(t, T_M)$ is the prevailing par swap rate at time t for a new swap with the same remaining maturity profile as the existing swap, and $A(t, T_{M,remaining})$ is the present value of a 1-unit per annum annuity factor for the remaining term, based on the current yield curve at time t.

4.4 Interest Rate Caps

4.4.1 Notation

- t: The current time (valuation date).
- N_V: The notional principal amount of the cap, upon which interest differentials are calculated.
- R_K: The strike rate (or cap rate) of the cap, an annualised percentage. If the reference rate exceeds R_K, the caplet for that period pays out.
- $L(T_{j-1}, T_j)$: The annualised floating market reference rate (e.g., 3-month BBSY) observed at time T_{j-1} (the reset date for period j) and applicable for the interest accrual period $[T_{j-1}, T_j]$.
- $T_0, T_1, \ldots, T_M$: A sequence of pre-agreed dates. For a cap, T_0 is often the start of the first period covered. $T_1, \ldots, T_M$ are the payment dates for each caplet (typically the end of each interest period). $T_0, T_1, \ldots, T_{M-1}$ are the reset dates for the reference rate L applicable to periods $[T_0, T_1], [T_1, T_2], \ldots, [T_{M-1}, T_M]$ respectively.
- τ_j: The day-count fraction for the j^{th} interest period, corresponding to the interval $[T_{j-1}, T_j]$.
- $Z(t, T_j)$: The risk-free discount factor at time t for a unit of currency payable at a future date T_j.
- $C(t)$: The interest rate cap's total premium (price) at time t.
- $c_j(t)$: The price at time t of an individual caplet covering the j^{th} period $[T_{j-1}, T_j]$ and paying at T_j.

4.4.2 Payoff Computation

For each individual caplet j, covering the period $[T_{j-1}, T_j]$ with payment at T_j: The payoff of the caplet at its payment date T_j, from the perspective of the cap buyer, is:

$$\text{Payoff}_{\text{caplet},j}(T_j) = N_V \cdot \max(0, L(T_{j-1}, T_j) - R_K) \cdot \tau_j \tag{31}$$

This payoff occurs only if the market reference rate $L(T_{j-1}, T_j)$ fixed at the beginning of the period T_{j-1} exceeds the strike rate R_K. If $L(T_{j-1}, T_j) \leqslant R_K$, the caplet for that period expires worthless, and its payoff is zero. The total cap consists of a series of such caplets.

4.4.3 Pricing

The price (premium) of an interest rate cap at time t is the sum of the present values of all its constituent caplets:

$$C(t) = \sum_{j=1}^{M} c_j(t) \tag{32}$$

Each caplet $c_j(t)$ can be priced as a European call option on the forward interest rate $F(t; T_{j-1}, T_j)$, which is the forward rate for the period $[T_{j-1}, T_j]$ as seen from the current valuation time t. The most common model for pricing caplets is an adaptation of the Black model (Black, 1976), a variant of the Black-Scholes-Merton model for options on forwards or futures.

The price of an individual caplet j (covering period $[T_{j-1}, T_j]$, payment at T_j) at time t (where $t \leqslant T_{j-1}$) is given by:

$$c_j(t) = N_V \cdot \tau_j \cdot Z(t, T_j) \left[F(t; T_{j-1}, T_j)\mathcal{N}(d_1) - R_K \mathcal{N}(d_2)\right] \tag{33}$$

where:

- $F(t; T_{j-1}, T_j)$: The forward interest rate at time t for the period $[T_{j-1}, T_j]$, compounded according to the day-count fraction τ_j. This forward rate is derived from the current zero-coupon yield curve:

$$F(t; T_{j-1}, T_j) = \frac{1}{\tau_j} \left(\frac{Z(t, T_{j-1})}{Z(t, T_j)} - 1 \right) \tag{34}$$

- $\sigma_{F,j}$: The annualised volatility of the forward rate $F(t; T_{j-1}, T_j)$ over the period until T_{j-1} (the rate-fixing date for the caplet), is a key unobservable input typically implied from market prices of caps/floors.
- $T^*_{j-1} = T_{j-1} - t$: Time from current valuation t until the fixing of the rate $L(T_{j-1}, T_j)$.
- $\mathcal{N}(\cdot)$: The cumulative standard normal distribution function.
- d_1 and d_2 are defined as:

$$d_1 = \frac{\ln(F(t; T_{j-1}, T_j)/R_K) + \frac{1}{2}\sigma^2_{F,j} T^*_{j-1}}{\sigma_{F,j}\sqrt{T^*_{j-1}}} \tag{35}$$

$$d_2 = d_1 - \sigma_{F,j}\sqrt{T^*_{j-1}} \tag{36}$$

The term $Z(t, T_j)$ discounts the expected payoff (at T_j) back to the current time t. The Black model effectively prices the caplet in a forward measure where the forward rate is the asset. The discount factors $Z(t, T_j)$ and the forward rates $F(t; T_{j-1}, T_j)$ are derived from the prevailing risk-free (or interbank) zero-coupon yield curve, which is typically bootstrapped from observable market instruments. The volatility $\sigma_{F,j}$ is a crucial input called "implied volatility" when backed out from market cap prices.

4.4.4 Greeks

The "Greeks" quantify the sensitivity of an interest rate caplet's price, $c_j(t)$ (defined in (33)), to changes in various underlying parameters.

Delta (Δ_j): Measures sensitivity to a change in the forward interest rate $F(t;T_{j-1},T_j)$.

$$\Delta_j = \frac{\partial c_j(t)}{\partial F(t;T_{j-1},T_j)} = N_V \tau_j Z(t,T_j)\mathcal{N}(d_1) \tag{37}$$

Reasoning: Positive; the caplet's value increases if its underlying forward rate $F(t;T_{j-1},T_j)$ increases.

Gamma (Γ_j): Measures the rate of change of Delta with respect to the forward rate $F(t;T_{j-1},T_j)$.

$$\Gamma_j = \frac{\partial^2 c_j(t)}{\partial F(t;T_{j-1},T_j)^2} = N_V \tau_j Z(t,T_j)\frac{\phi(d_1)}{F(t;T_{j-1},T_j)\sigma_{F,j}\sqrt{T^*_{j-1}}} \tag{38}$$

where $\phi(\cdot)$ is the standard normal probability density function, and d_1 is defined in (35). *Reasoning*: Positive; indicates how much Delta changes for a unit change in $F(t;T_{j-1},T_j)$.

Vega (ν_j): Measures sensitivity to a change in the volatility $\sigma_{F,j}$ of the forward rate.

$$\nu_j = \frac{\partial c_j(t)}{\partial \sigma_{F,j}} = N_V \tau_j Z(t,T_j)F(t;T_{j-1},T_j)\phi(d_1)\sqrt{T^*_{j-1}} \tag{39}$$

Reasoning: Positive; higher volatility increases the chance of the caplet finishing in-the-money, thus increasing its value.

Theta (Θ_j): Measures sensitivity to the passage of time t (as $T^*_{j-1} = T_{j-1} - t$ decreases). A principal component of $\frac{\partial c_j(t)}{\partial t}$ is:

$$\Theta_j \approx -N_V \tau_j Z(t,T_j)\frac{F(t;T_{j-1},T_j)\phi(d_1)\sigma_{F,j}}{2\sqrt{T^*_{j-1}}} \tag{40}$$

Reasoning: Generally negative; represents time decay, so the caplet's value typically erodes as its rate-fixing date T_{j-1} approaches.

Rho (ρ_j): Measures sensitivity to a change in the risk-free interest rate r (which underpins the discount factor $Z(t,T_j)$ and influences the forward rate $F(t;T_{j-1},T_j)$). A key component is:

$$\rho_j \approx N_V \tau_j (T_j - t)Z(t,T_j)R_K\mathcal{N}(d_2) \tag{41}$$

where d_2 is defined in (36). *Reasoning*: Generally positive for a caplet; higher rates tend to increase $F(t;T_{j-1},T_j)$ and decrease the present value of R_K, both effects directionally positive for a call's value.

The Greeks for an entire interest rate cap $C(t)$ are the sum of these corresponding Greeks for each of its M constituent caplets: e.g., $\Delta_{\text{cap}}(t) = \sum_{j=1}^{M} \Delta_j(t)$.

5 Hedging Deliberations

5.1 Not Hedging

The strategic decision to remain unhedged against interest rate risk implies that PPT consciously accepts the direct financial impact of fluctuations in the 3-month Bank Bill Swap Rate (BBSY). This rate is the floating reference for its newly acquired \$300 million in debt facilities. Such a strategy reflects a managerial assessment where the benefits of potentially favourable interest rate movements outweigh the costs or constraints associated with hedging instruments. This may also indicate that the firm's operational cash flows possess sufficient resilience to absorb interest rate volatility or that hedging instruments' costs are uneconomical (Stulz, 1996).

5.1.1 Mechanics

The operational mechanics of a non-hedging strategy are characterised by their simplicity, wherein PPT elects to service their debt obligations at the prevailing market rates. Specifically, interest payments on the \$100m Prime Corporate Tower (PCT) facility will be at 3-month BBSY plus a 1.20% margin, and on the \$200m Sterling Square (SS) facility at 3-month BBSY plus a 1.50% margin. These interest obligations will reset quarterly, ensuring that the firm's interest expense profile remains directly correlated with short-term interest rate movements.

5.1.2 Size or Number of Contracts

Under a strategy of not hedging, PPT does not engage in any off-balance sheet derivative contracts to mitigate interest rate risk. Consequently, the size or number of hedging contracts is zero. The entire nominal value of the floating-rate debt, amounting to \$300 million, remains exposed to interest rate fluctuations.

5.1.3 Position and Contract Maturities

Contract maturities are inapplicable in this scenario, as no hedging instruments are utilised. The pertinent maturities are those of the underlying debt facilities: the \$100m PCT facility has a 3-year tenor and is subject to refinancing, while the \$200m SS facility has a 5-year tenor. Therefore, the unhedged interest rate position extends across these periods, with specific managerial concerns directed towards the upcoming 12-month budget cycle.

5.1.4 Timing and Tenor

The unhedged strategy is effectuated from the initial drawdown of the debt facilities. It persists for the duration of these loans or until management elects to implement a hedging program. The tenor of this unhedged exposure aligns with the respective tenors of the PCT and SS debt facilities. Each quarterly interest rate reset can be viewed as a discrete point at which the unhedged strategy is implicitly reaffirmed for the subsequent period based on the prevailing BBSY fixing.

5.1.5 Initial and Ongoing Cashflows and Costs

No direct initial costs are associated with *not* entering into derivatives contracts to hedge exposures. The primary benefit of not hedging is avoiding upfront premium payments (for options) or potential transaction costs associated with entering other derivatives positions.

The ongoing cashflows and costs are the variable quarterly interest payments due on the floating rate debt (\$300 million), which is given by:

$$\begin{aligned}\text{Interest Payment} = &\left(\text{Principal}_{PCT} \cdot (\text{BBSY}_{3m} + \text{Spread}_{PCT})\right)/4 \\ &+ \left(\text{Principal}_{SS} \cdot (\text{BBSY}_{3m} + \text{Spread}_{SS})\right)/4\end{aligned} \tag{42}$$

The "cost" inherent in this strategy is the economic uncertainty surrounding these payments, which will fluctuate directly with BBSY. Indirect costs may arise while no explicit fees are paid for hedge maintenance. These can include increased managerial resources devoted to monitoring market volatility and re-forecasting and potentially a higher cost of capital or reduced firm valuation if investors perceive the unhedged risk as excessive (Smith and Stulz, 1985; Stulz, 1996).

5.1.6 Expected Outcomes or Payoffs

The financial outcome of an unhedged strategy is contingent upon the realised path of future interest rates, juxtaposed with PPT's treasury team's expectations. Contextually, if prevailing market rates rise, PPT weathers escalating interest expenses, which reduce operating cash flows and pressure the ICR, directly eroding firm profitability. Conversely, if interest rates decline, PPT benefits from reduced interest payments, enhancing cash flows and improving the ICR. However, a notable characteristic is the market rate volatility regardless of net direction, wherein PPT's interest expenses become unpredictable, complicating financial planning, budgeting and potentially dividend policy. Such volatility can be particularly detrimental to REITs, which are often valued for stable and predictable income streams. The sensitivity of the annual interest expense and ICR to changes in BBSY is illustrated in Figure 1.

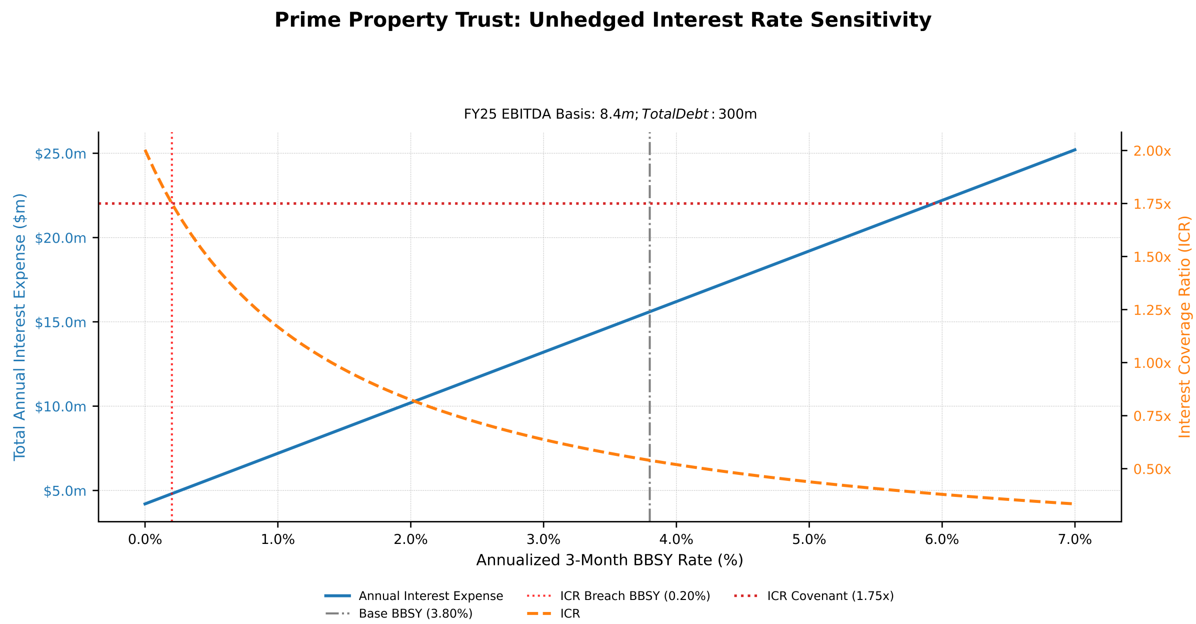

Figure 1: Sensitivity of Prime Property Trust's Annual Interest Expense and ICR to BBSY Changes under an Unhedged Strategy.

The payoff structure is linear concerning BBSY changes; each basis point movement in the 3-month BBSY directly alters the quarterly interest expense by $7,500 on the combined $300 million facilities.

5.1.7 Risks and Downside

The decision to forego hedging exposes PPT to several material risks amplified by the firm's financial structure and covenants.

Interest rate risk, the direct risk that increases in the 3-month BBSY, will lead to higher debt servicing costs, given that PPT's explicit communications about budgeted cost obligations constitute a primary risk factor.

Maintaining an interest coverage ratio (ICR) greater than 1.75x is a significant constraint. Previously expounded upon, the pro-forma ICR is approximately 0.54x (FY25 "Net Rentals (EBITDA)" of $8,412k and the base case FY25 BBSY of 3.75%), which is substantially below the covenant threshold. An unhedged strategy offers no protection against further BBSY increases, which would lower the ICR, almost certainly ensuring a breach. The consequences of such a breach can be severe, ranging from the imposition of stricter terms by lenders and demands for early repayment to, ultimately, insolvency (Smith and Stulz, 1985; Titman and Wessels, 1988). The high leverage implied by this low ICR makes the firm particularly vulnerable.

Unhedged interest expenses introduce significant volatility into PPT's earnings and cash flow profile, wherein this unpredictability can complicate internal capital budgeting and strategic planning (Froot et al., 1993), lead to underinvestment if internally generated funds are unexpectedly diverted to higher debt servicing (Mayers and Smith, 1987) or engender equity market penalisation, especially for REITs where investors often seek stable dividend yields (Ooi et al., 2006).

5.1.8 Feasibility and Suitability

The operational feasibility of a non-hedging strategy is indisputable, as it represents the default state requiring no proactive financial market intervention or associated transaction costs. PPT can readily implement this strategy by simply servicing its debt obligations as they fall due, based on the prevailing floating market rates. However, the critical question pertains to the suitability of such an approach for PPT, given its specific financial structure, risk exposures, stated objectives, and the broader expectations for entities within the REIT sector (Myer and Webb, 1993).

The decision not to hedge material financial risks can be suboptimal if such risks increase the probability of financial distress or lead to underinvestment in valuable projects (Froot et al., 1993; Smith and Stulz, 1985). Moreover, the Treasury team's explicit concern regarding the impact of interest rate movements on their ability to meet budgeted cost obligations over the next year contravenes the inherent uncertainty accepted by forgoing hedging. An unhedged position directly exposes PPT's interest expense and budget adherence to the full volatility of the 3-month BBSY.

The nature of REITs and the expectations of their investors generally favour stable and predictable income streams, often to support regular distributions (Giliberto, 1990). The market can perceive the earnings volatility introduced by unhedged, large-scale floating-rate debt negatively, potentially increasing PPT's cost of equity or reducing its valuation multiples (Allayannis and Weston, 2001). Furthermore, the Sterling Square (SS) development, representing $200m of the new debt, will be in a non-income-generating construction phase until FY27. During this period, its floating-rate interest payments will be a direct charge against earnings generated by other assets, heightening the sensitivity of PPT's overall financial health to interest rate spikes. Not hedging this specific exposure during the construction phase is particularly risky.

From a managerial decision-making standpoint, the theory of real options might suggest that maintaining flexibility (by not locking into hedges) has value, especially in uncertain environments (Davis, 1996). However, this value of flexibility must be weighed against the potentially catastrophic costs of a covenant breach. Given the apparent severity of the ICR situation, the argument for preserving flexibility by not hedging is substantially weakened. The primary objective should shift towards ensuring financial stability and covenant compliance (Tufano, 1996).

5.1.9 Conclusion

Remaining unhedged, while the simplest option, exposes Prime Property Trust to unmitigated interest rate risk that directly threatens its ability to meet budgeted costs and, critically, to comply with its ICR covenant. Given the projected financials, this strategy is exceptionally high-risk and appears unsuitable for PPT. It would require a radical deviation from prudent financial management unless significant undisclosed information alters the risk landscape.

5.2 Forwards

5.2.1 Mechanics

A Forward Rate Agreement (FRA) is an Over-The-Counter (OTC) bilateral contract where two parties agree on an interest rate (R_{FRA}) to be applied to a specified notional principal for a predetermined future period (e.g., a 3-month period starting in 3 months is a "3x6" FRA). The notional principal is not exchanged; the contract is cash-settled based on the difference between the agreed R_{FRA} and the actual market reference rate (R_{Market}, e.g., 3-month BBSY) observed on the settlement date at the beginning of the FRA period. The settlement amount effectively compensates the party, which is advantaged by the rate movement.

5.2.2 Size or Number of Contracts

The "size" of an FRA is its notional principal amount (N_V). For PPT to hedge a specific quarterly interest payment on one of its loan facilities (e.g., the \$100m PCT facility or the \$200m SS facility), it would enter into an FRA with a notional principal precisely matching that loan amount for that specific quarter. Unlike exchange-traded futures with standardised contract sizes, FRAs offer complete flexibility in tailoring the notional to the exact exposure. Typically, one FRA contract is executed for each discrete future interest period and notional to be hedged. While a minimum-variance hedge ratio (h^*) could theoretically be estimated, for an FRA designed to hedge its exact underlying reference rate (3-month BBSY) for a perfectly matched period, h^* is effectively 1.0, making notional matching the optimal and standard approach (**lt**).

5.2.3 Position and Contract Maturities

To protect against rising interest rates, PPT would act as an FRA buyer. This position benefits if the market reference rate at settlement ($L(T_0, T_1)$) exceeds the agreed R_{FRA}. An FRA is defined by two key dates: the Settlement Date (T_0) when the market reference rate is fixed, and cash settlement occurs (marking the start of the hedged interest period), and the Maturity Date (T_1), marking the end of this period. For PPT's quarterly resetting debt, FRAs covering sequential 3-month periods would be used (e.g., a "3x6" FRA hedges the 3 months starting three months hence).

5.2.4 Timing and Tenor

The timing of entering an FRA involves PPT committing today to an R_{FRA} for a specific future period, based on its interest rate outlook and desire to lock in a rate before the actual BBSY fixing. The R_{FRA} is determined by the prevailing forward yield curve at the transaction time. The tenor of an individual FRA is short (e.g., 3 months for PPT). To hedge multiple future quarters, such as the "next year," PPT would use a strip of FRAs—separate FRA contracts for each successive period (e.g., 0x3, 3x6, 6x9, 9x12 FRAs). Liquidity for FRAs generally diminishes for periods starting further in the future (Fleming et al., 2012).

5.2.5 Initial and Ongoing Cashflows and Costs

A key feature of at-market FRAs is the absence of an initial premium or payment if the agreed R_{FRA} equals the prevailing market-implied forward rate. The FRA has a zero initial value. There are no interim cash flows or margin calls during the FRA's life, distinguishing them from futures and simplifying liquidity management. The sole cash flow occurs on the settlement date (T_0), representing the net difference between interest calculated at R_{Market} and R_{FRA}. Transaction costs are embedded in the bid-ask spread of the R_{FRA} quoted by the financial institution.

5.2.6 Expected Outcomes or Payoffs

The primary outcome for an FRA buyer like PPT is eliminating uncertainty regarding the benchmark interest rate for a specific future borrowing period. If R_{Market} at settlement is higher than R_{FRA}, PPT receives a net cash payment, compensating for higher loan interest. If R_{Market} is lower, PPT makes a net payment, offsetting the loan's lower interest cost. PPT's effective benchmark borrowing cost for the hedged period is thus locked in at approximately R_{FRA}, resulting in a total effective cost of R_{FRA} plus the loan spread, thereby providing certainty for budgeting.

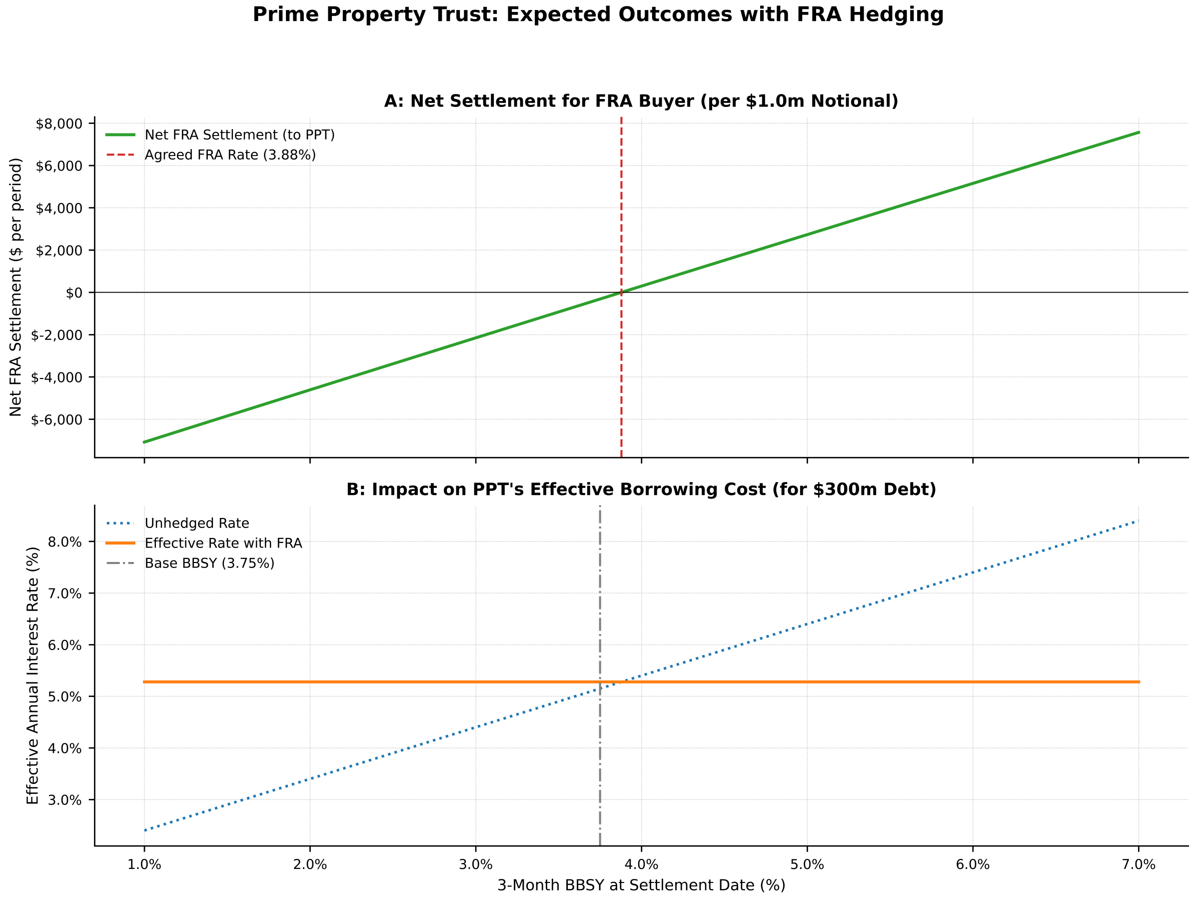

Figure 2: Payoff Profile of a short FRA position.

5.2.7 Risks and Downside

FRAs entail specific risks. Counterparty credit risk exposes PPT to the counterparty's potential default on settlement payments if the FRA is in the money for PPT. This is managed via credit assessments and ISDA Master Agreements (Gregory, J., 2010). An opportunity cost exists: if R_{Market} falls significantly below R_{FRA}, PPT forgoes the benefit of lower rates due to the FRA payment. Basis risk, though typically low for direct hedges, can arise if the FRA's reference rate or fixing mechanism imperfectly matches the loan's terms (Oldfield, G.S. & Rogalski, R.J., 1981, discuss basis risk in forward markets generally). Unwinding an FRA before settlement can be illiquid and requires negotiation with the original counterparty, with costs depending on intervening rate movements. The single-period focus of each FRA means hedging multiple periods requires a strip of contracts, which can be administratively more intensive than a single multi-period instrument like a swap.

5.2.8 Feasibility and Suitability

FRAs are highly feasible for PPT, being standard, customisable OTC products. They suit PPT's short-term hedging needs by providing precise certainty for specific upcoming quarterly interest resets, aiding budget control and ICR management for those discrete periods. The absence of upfront premium and margin calls is operationally attractive. However, for comprehensive long-term hedging of multi-year facilities (PCT and SS), managing a strip of FRAs becomes increasingly complex and potentially less liquid for distant tenors compared to alternative derivatives instruments (Froot et al., 1993; Smith and Stulz, 1985).

5.2.9 Conclusion

Forward Rate Agreements offer Prime Property Trust a precise OTC tool to lock in interest rates for specific future quarterly loan periods, directly supporting budget certainty. Their customizability and lack of ongoing cash flow requirements (pre-settlement) are advantageous for targeted, short-term risk management. While suitable for hedging discrete near-term exposures (e.g., via a 12-month strip), FRAs may be less efficient than other instruments for comprehensive, multi-year hedging strategies due to liquidity constraints in longer tenors and the administrative complexities of managing numerous individual contracts. Counterparty risk is a manageable consideration.

5.3 Futures

5.3.1 Mechanics

To hedge against rising interest rates on its floating-rate debt, Prime Property Trust (PPT) would establish a short position by selling ASX 90-Day Bank Bill Futures. This strategy creates an offsetting financial exposure: an increase in the 3-month Bank Bill Swap Rate (BBSY) by the loan's reset date leads to a decrease in the price of the Bank Bill Futures (quoted as $100 - \text{Yield}$). Consequently, PPT's short futures position would generate a profit upon cash settlement or, if closed out (by repurchasing the contracts) at this lower price. This profit is designed to substantially counteract the increased interest expense on PPT's underlying loans. Conversely, a decrease in BBSY would result in a future loss, largely offsetting the benefit of lower loan interest payments. The contracts are cash-settled against the 3-month BBSY fixing, providing a direct hedging mechanism against this specific benchmark and effectively aiming to convert a variable interest rate exposure into a more predictable rate for the hedged period.

5.3.2 Size or Number of Contracts

The optimal number of futures contracts (N_c) is determined by the minimum-variance hedge ratio (h^*), the notional amount to be hedged (V_A), and the notional value per futures contract (V_F): $N_c = h^* \cdot (V_A/V_F)$. The minimum-variance hedge ratio, $h^* = \rho_{S,F}(\sigma_S/\sigma_F)$, where $\rho_{S,F}$ is the correlation coefficient between changes in spot rates (ΔS) and futures rates (ΔF), and σ_S, σ_F are their respective standard deviations, is crucial for effective risk reduction (Ederington, 1979). For hedging 3-month BBSY with ASX 90-Day Bank Bill Futures, h^* is theoretically close to 1.0 due to their direct linkage and congruent tenors, suggesting approximately 300 contracts (each with a $1 million notional) for PPT's $300 million quarterly exposure. While the empirical estimation of h^* using historical data can refine this, a unitary hedge ratio is a common and practical starting point for such closely matched hedges (**lt**).

5.3.3 Position and Contract Maturities

To protect against rising interest rates, PPT must establish and maintain a short position by selling ASX 90-Day Bank Bill Futures. These contracts have standardised quarterly maturity months. PPT would select contracts whose settlement dates align closely with the commencement of its quarterly loan interest periods. For comprehensive risk management over 12 months, a strip hedge would be implemented, involving the sale of a series of futures contracts with successive quarterly maturities (e.g., June, September, December, and the following March contracts) to synthetically extend the hedging horizon (Cotter and Hanly, 2009).

5.3.4 Timing and Tenor

The timing of hedge initiation for each quarterly period should precede the relevant BBSY fixing date. It will be influenced by PPT's interest rate forecasts, risk tolerance, and the prevailing forward yield curve implied by futures prices. The tenor for PPT's immediate "next year" concern is achievable via a strip of four quarterly contracts. Hedging longer-term exposures, such as the 5-year Sterling Square facility, with futures necessitates a rolling hedge strategy: systematically closing maturing short positions and re-establishing them in later-dated contracts. This process introduces "roll risk", the uncertainty associated with the prices at which future contracts can be rolled forward, influenced by changes in the forward yield curve and inter-contract spreads (Adam and Fernando, 2005).

5.3.5 Initial and Ongoing Cashflows and Costs

Hedging with exchange-traded futures involves distinct cash flows. An initial margin per contract must be deposited with the clearing member—a collateral deposit, not an expense, mandated by ASX Clear (Futures) to cover potential initial adverse price movements. Futures positions are marked-to-market daily, meaning changes in value are settled in cash daily. If futures prices rise (yields fall), PPT's short position incurs a loss debited from its margin account; if prices fall (yields rise), a profit is credited. Margin calls occur if the account balance falls below maintenance, requiring immediate cash replenishment. This daily margining creates significant liquidity risk that requires robust cash flow management (Fishe and Goldberg, 1986; Brunnermeier and Pedersen, 2009). Brokerage commissions are incurred for executing trades. Notably, unlike options, establishing a futures position entails no upfront premium.

5.3.6 Expected Outcomes or Payoffs

A short futures hedge aims to stabilise effective borrowing costs against BBSY variability. The profit and loss (P&L) from the futures position is designed to offset changes in the BBSY component of loan interest payments. If BBSY at expiry is higher than the yield at which futures were sold ($Y_{F,entry}$), the futures generate a profit, compensating for higher loan interest. If BBSY is lower, a future loss largely offsets the lower loan interest. PPT's effective interest rate for the hedged period is thus substantially "locked in" near $Y_{F,entry}$ plus its loan spread, aiding in meeting budgeted costs.

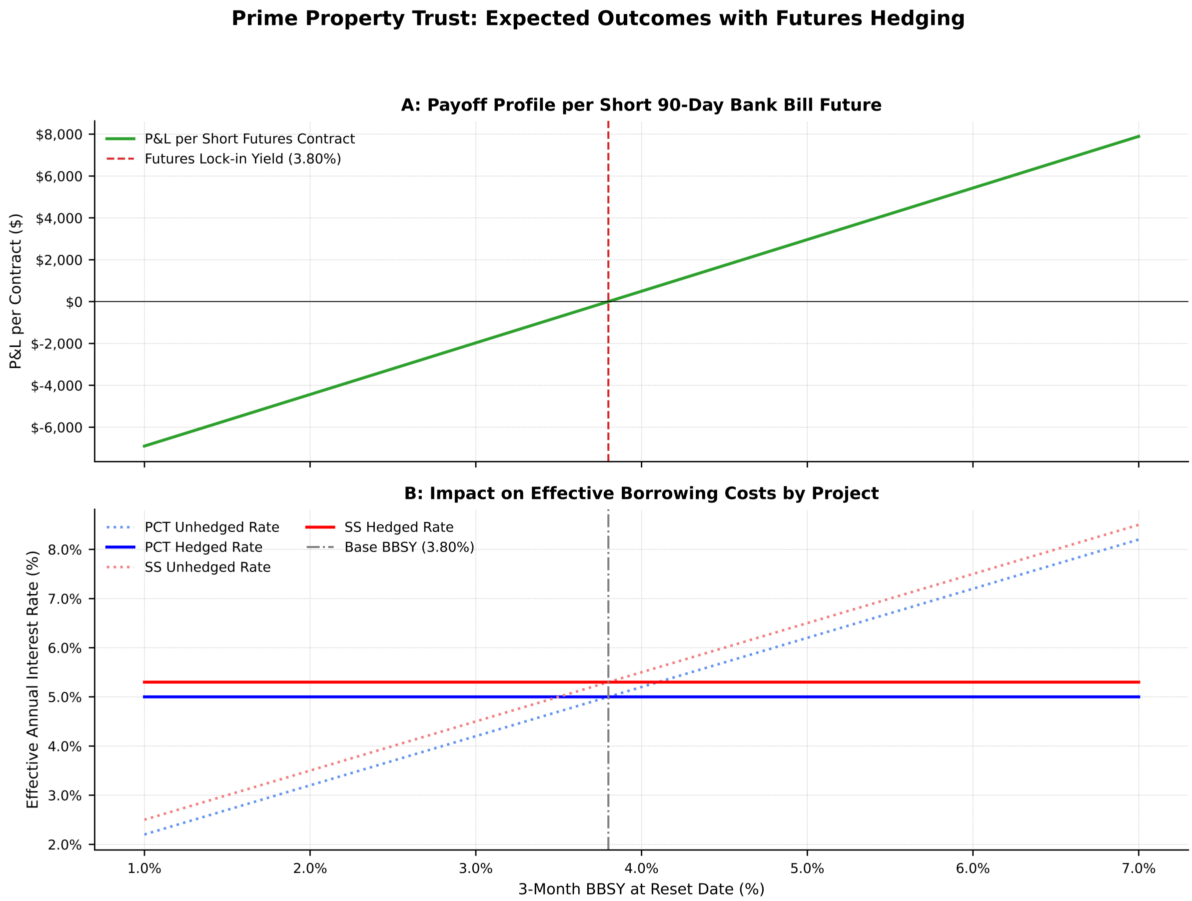

Figure 3: Payoff Profile of the Short Futures Position

5.3.7 Risks and Downside

Futures hedging entails several risks. Basis risk arises if the futures price does not move perfectly with the spot BBSY determining loan payments. Although ASX 90-Day Bank Bill Futures are cash-settled against BBSY, mitigating this risk at expiry, discrepancies can occur from fixing time differences or if the hedge is lifted pre-expiry (Adam and Fernando, 2005). Margin call risk (liquidity risk) is critical due to daily mark-to-market; adverse price movements can trigger substantial, unpredictable margin calls, necessitating readily available liquid assets (Fenn and Kupiec, 1993; Garleanu and Pedersen, 2011). Rolling risk applies to long-term hedges, involving uncertainty in the prices for future contracts when rolling positions forward. Hedge ratio risk (model risk) exists if the empirically estimated h^* is suboptimal due to non-stationary correlations or volatilities (**lt**). An opportunity cost is inherent as futures provide a symmetric outcome, foregoing benefits if BBSY falls below the locked-in rate.

5.3.8 Feasibility and Suitability

Hedging with ASX 90-Day Bank Bill Futures is highly feasible for a corporate entity such as Prime Property Trust (PPT), as these exchange-traded instruments on the Australian Securities Exchange (ASX) ensure price transparency, regulatory oversight and significantly reduced counterparty credit risk via the intermediation of ASX Clear (Futures). Liquidity for nearer-dated contracts is generally robust, facilitating efficient trade execution. However, PPT must establish appropriate brokerage relationships and internal controls to manage future trading and margin accounts. In terms of suitability, futures directly address PPT's budget concerns by enabling greater certainty over interest expenses, which is crucial for financial planning and Interest Coverage Ratio (ICR) covenant management (Mayers and Smith, 1987). However, the efficacy of a futures hedge in resolving PPT's severe ICR pressure is contingent on the level at which interest rates can be locked relative to its projected EBITDA. The primary operational challenge is the daily variation margining, which demands robust liquidity management. While a strip hedge is viable for addressing concerns over the "next year," a rolling strategy for longer tenors, such as for the 5-year Sterling Square (SS) facility, introduces roll risk and operational complexity. Nonetheless, by reducing earnings volatility, hedging with futures can align with REIT investor preferences, reduce financial distress costs and stabilise cash flows, thereby facilitating core operations (Froot et al., 1993; Smith and Stulz, 1985).

5.3.9 Conclusion

ASX 90-Day Bank Bill Futures offer Prime Property Trust a transparent and liquid means to mitigate 3-month BBSY volatility. A short-term strategy can stabilise interest expenses, aiding budgetary predictability and ICR management, particularly for short-to-medium terms. Key considerations are the operational demands of daily margining and the symmetric hedge outcome, foregoing gains from falling rates. While effective in capping further borrowing cost increases, their ability to resolve PPT's existing ICR covenant pressure is contingent on the prevailing market-implied forward rates.

5.4 Swaps

5.4.1 Mechanics

An interest rate swap (IRS) is a contractual agreement between two counterparties to exchange a series of interest payments over a specified period, calculated on a common notional principal amount, which itself is typically not exchanged. In its most common form, a "plain vanilla" swap, one party agrees to make payments based on a predetermined fixed interest rate. Conversely, the other party agrees to make payments based on a floating interest rate, such as the Bank Bill Swap Rate (BBSY) or another relevant reference rate. On each scheduled payment date (e.g., quarterly or semi-annually), these obligations are usually netted, with only the difference being paid by the party owing the larger amount. The fixed rate of the swap is determined at inception such that the initial market value of the swap is typically zero for both parties, reflecting prevailing market conditions and expectations for future interest rates. This derivative allows entities to effectively transform the nature of their interest rate exposures or receipts without altering their underlying debt or asset portfolios.

5.4.2 Size or Number of Contracts

The size of an interest rate swap is its notional principal amount. For Prime Property Trust (PPT) to fully convert a floating-rate loan to a synthetic fixed-rate obligation, the swap's notional principal would typically match the loan's principal. For instance, a $100 million swap for the Prime Corporate Tower (PCT) facility and a $200 million swap for the Sterling Square (SS) facility would directly hedge the benchmark rate exposure. The Over-The-Counter (OTC) nature of swaps facilitates precise tailoring of this notional amount, a key advantage over standardised contracts. While more complex strategies might employ duration or PV01 matching, direct notional matching is standard and effective for converting specific loan exposures when the swap's floating leg mirrors the loan's benchmark and payment frequency (Mao and Li, 2002). Using a swap notional less than the loan principal, partial hedging remains an option.

5.4.3 Position and Contract Maturities

To transform its floating-rate debt payments into fixed obligations, PPT would enter into a payer swap, agreeing to pay the fixed rate and receive the floating rate (e.g., 3-month BBSY). This transaction effectively neutralises the variability of its benchmark interest payments on the underlying debt. The maturity of the IRS can be customised to align with the tenor of the debt exposure PPT intends to hedge. For instance, a 3-year swap could hedge the PCT facility, and a 5-year swap could cover the SS facility. The ability to precisely match the liability's tenor is a significant advantage of swaps, particularly for longer-term hedging, compared to strategies involving rolling shorter-dated instruments, which can introduce roll risk and administrative burden (Davis, 1996).

5.4.4 Timing and Tenor

The swap should ideally be executed when PPT decides to lock in a fixed interest rate for future payments, with the achievable fixed rate contingent upon swap market conditions. Concerns regarding specific future periods, such as the "next year," might prompt consideration of swaps covering that particular timeframe, potentially including forward-starting swaps that become effective at a future date. The tenor of an IRS is highly customisable, from months to many years, allowing precise alignment with debt facility lifespans or specific hedging horizons, thereby mitigating risks associated with maturity mismatches (Tufano, 1996). While generally robust for standard tenors, market liquidity in interest rate swaps can be influenced by monetary policy events and broader fixed-income market conditions (Boudiaf et al., 2024).

5.4.5 Initial and Ongoing Cashflows and Costs

Standard at-market interest rate swaps typically involve no upfront premium, as the fixed rate is set to equalise the present values of the fixed and expected floating legs at inception. Transaction costs or bid-ask spreads are implicitly incorporated into the agreed fixed rate by the swap dealer. If an "off-market" swap is structured (with a fixed rate differing from the prevailing market rate), an upfront payment from one party to the other would be required to compensate for this deviation. Ongoing cash flows consist of periodic net interest payments.

5.4.6 Expected Outcomes or Payoffs

The principal outcome for PPT from entering a payer interest rate swap is converting its variable interest expense on the notional amount to a predictable fixed expense. This directly supports PPT's goal of mitigating interest rate volatility impacts on budgeted costs. Should actual BBSY rates exceed the swap's fixed rate (R_{FIX}), PPT's higher loan payments are offset by net receipts from the swap. Conversely, if BBSY falls below R_{FIX}, PPT makes net payments on the swap but benefits from lower loan payments, resulting in an effective benchmark cost near R_{FIX}. This certainty in interest expense aids financial planning and is crucial for managing financial covenants like the Interest Coverage Ratio (ICR) by stabilising a major financing cost component. Empirical studies have shown that firms, particularly those with higher leverage or lower credit ratings, often enter swaps as fixed-rate payers to manage such risks (Mao and Li, 2002; Titman, 1992). The trade-off is forgoing potential savings if BBSY falls substantially below the locked-in fixed rate.

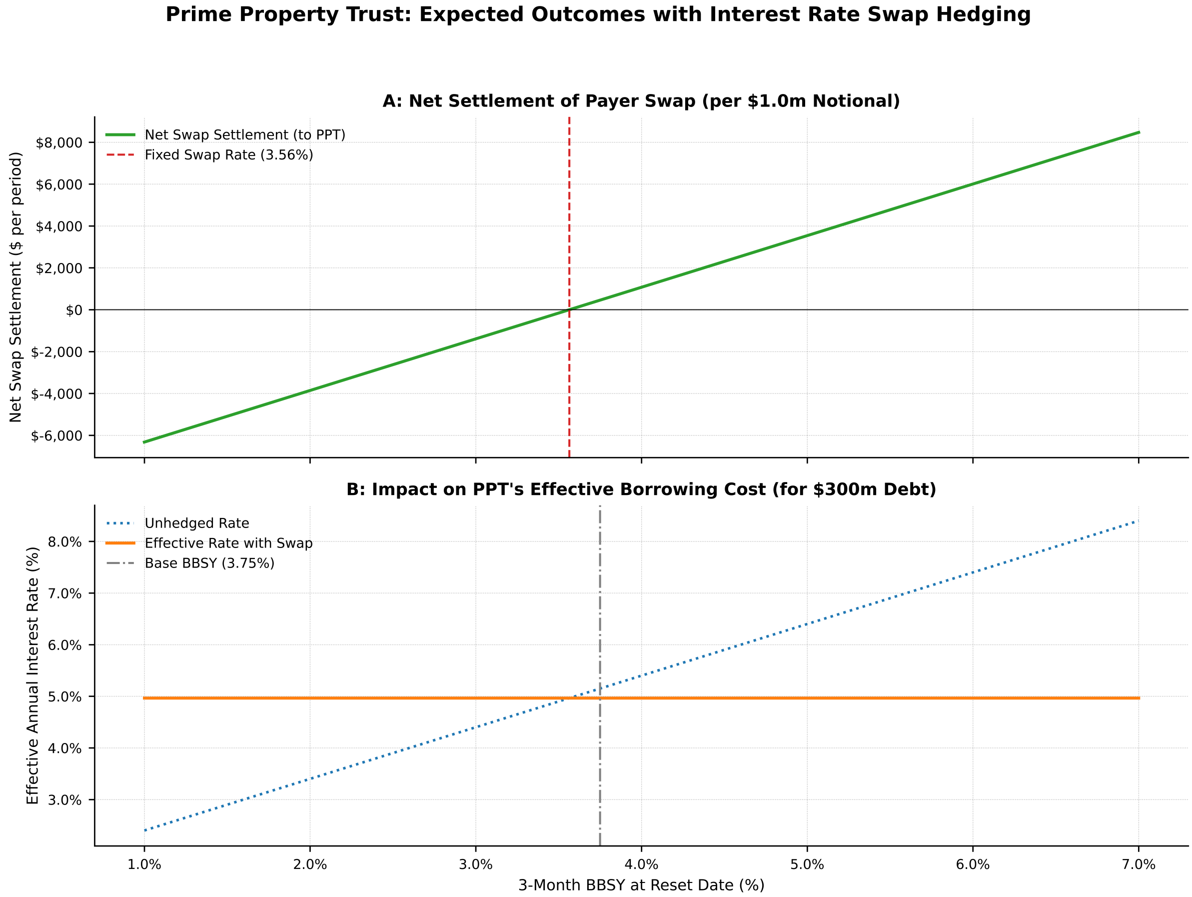

Figure 4: Payoff Profile of the Payer Swap Position

5.4.7 Risks and Downside

Interest rate swaps, while effective, carry inherent risks. Counterparty credit risk is prominent in OTC contracts, where PPT faces the risk of the swap counterparty defaulting, especially if the swap is significantly in-the-money for PPT. This risk is managed via ISDA Master Agreements, netting provisions, and collateral posting under Credit Support Annexes (CSAs). Regulatory initiatives have also promoted central clearing for many standard swaps, significantly mitigating this risk by interposing a Central Counterparty (CCP) (Menkveld and Vuillemey, 2021). An opportunity cost arises as PPT forgoes benefits if BBSY falls significantly below the fixed swap rate. Basis risk, though typically low for plain vanilla swaps, can occur if the swap's floating leg terms (e.g., fixing conventions, payment dates) do not perfectly match the underlying loan terms (Duffie and Singleton, 1997). Liquidity and early termination risks exist; unwinding a bespoke OTC swap before maturity can be complex and potentially costly, depending on prevailing rates and the swap's remaining life. Finally, documentation and legal costs are associated with establishing ISDA agreements.

5.4.8 Feasibility and Suitability

Interest rate swaps are highly feasible for PPT, as they are standard, customisable OTC products that financial institutions offer. Their suitability for PPT is compelling. Swaps provide budget certainty by fixing variable interest expenses, which is crucial for meeting cost obligations and managing the ICR covenant, especially given its current sensitivity. This aligns with corporate risk management theories, where firms hedge to reduce expected costs of financial distress and stabilise cash flows (Smith and Stulz, 1985; Froot et al., 1993). Matching long tenors, such as for the 3-year PCT and 5-year SS facilities, is a distinct advantage, avoiding roll risk. This is particularly beneficial for the SS facility during its non-income-generating construction phase. The predictable interest expense profile achieved through swaps for REITs can attract investors seeking stable distributions (Browne and Case, 1992). The main trade-off remains the opportunity cost if rates decline. Recent trends in real estate finance indicate an increasing consideration of swaps as hedging instruments, particularly as the cost of alternatives like caps fluctuates.

5.4.9 Conclusion

Interest rate swaps offer Prime Property Trust a robust and highly customisable solution for converting its floating-rate interest exposure on 3-month BBSY to fixed payments. This strategy addresses ensuring budget certainty, managing the Interest Coverage Ratio, and providing long-term interest rate protection matched to debt tenors, particularly for the new PCT and SS facilities. The primary cost is the potential opportunity cost in a falling-rate environment. Given PPT's financial context and risk management needs, the benefits of predictable financing costs through swaps outweigh the inherent risks, making them a highly suitable hedging instrument.

5.5 Options

5.5.1 Mechanics

An Interest Rate Cap, an Over-The-Counter (OTC) derivative, functions as a sequence of European call options (caplets) on a specified interest rate, providing indemnification to the buyer should the reference rate surpass a predetermined strike rate (R_K) during contractual agreed periods. The premium paid by the cap buyer compensates the seller for undertaking the obligation of potential future payments, the magnitude of which is determined by the cap's strike, tenor, the prevailing forward yield curve, and, crucially, the implied volatility of future interest rates (Black, 1976; Merton, 1973). While designed to protect borrowers, the imposition and structure of interest rate caps can have complex, sometimes unintended, macroeconomic consequences, including impacts on credit supply and pricing transparency, as documented in analyses of their use as policy tools (World Bank, 2018). The payout for each caplet, should the reference rate $L(T_{j-1}, T_j)$ exceed R_K over an interest period τ_j for a notional N_V, is $N_V \cdot \max(0, L(T_{j-1}, T_j) - R_K) \cdot \tau_j$.

5.5.2 Size or Number of Contracts

The primary dimension of an interest rate cap is its notional principal, which is tailored to the hedger's specific underlying debt amount. Understanding the option's sensitivities, or "Greeks," is critical for assessing its cost and hedge effectiveness. Delta (Δ) quantifies the cap's price change relative to movements in the underlying interest rate, indicating initial hedge responsiveness. Gamma (Γ) measures the rate of change of Delta, highlighting how this responsiveness adjusts as rates fluctuate, being the highest for at-the-money options. Vega (ν) captures sensitivity to implied volatility, a key component of the premium, reflecting the market's expectation of future rate uncertainty. Theta (Θ) represents the erosion of the cap's value as time to expiry decreases, a direct cost of holding the option. Effective risk management using options necessitates carefully monitoring and interpreting the chosen instruments through the "greeks" framework (Wadhawan and Singh, 2015).

5.5.3 Position and Contract Maturities

A hedger seeking protection against rising interest rates, such as Prime Property Trust (PPT), would adopt a long position by purchasing an interest rate cap. The maturities of the individual caplets are structured to align with the interest reset dates of the hedged floating-rate debt. At the same time, the overall tenor of the cap is customised to the desired length of protection.

5.5.4 Timing and Tenor

The decision to purchase a cap involves assessing prevailing market conditions, particularly forward interest rates and implied volatility, which directly influence the premium. The selected strike rate (R_K) is a pivotal choice, balancing the desired level of protection against the upfront cost; lower strikes offer greater protection but incur higher premiums. The tenor is customised to the hedging horizon. Academic work explores optimal strategies in related derivative markets, such as swaptions, considering the dynamics of volatility and skewness, which are influenced by macroeconomic beliefs and monetary policy objectives (Titman, 1992).

5.5.5 Initial and Ongoing Cashflows and Costs

The cap buyer makes a single, non-refundable upfront premium payment. A significant advantage is the absence of ongoing margin calls from the seller, simplifying cash flow forecasting post-purchase. The buyer continues to service its underlying debt. If, on any reset date, the reference rate surpasses the strike, the cap seller makes a payment to the buyer, offsetting the increased interest cost on the loan for that period.

5.5.6 Expected Outcomes or Payoffs

The cap provides an asymmetric payoff: if the benchmark rate exceeds the strike, the buyer's effective benchmark cost is limited to the strike rate (plus spread and amortised premium). If the benchmark remains below the strike, the buyer benefits from lower prevailing rates, with the only hedging cost being the amortised premium for that period. This structure ensures protection against rate upswings while allowing participation in rate downswings.

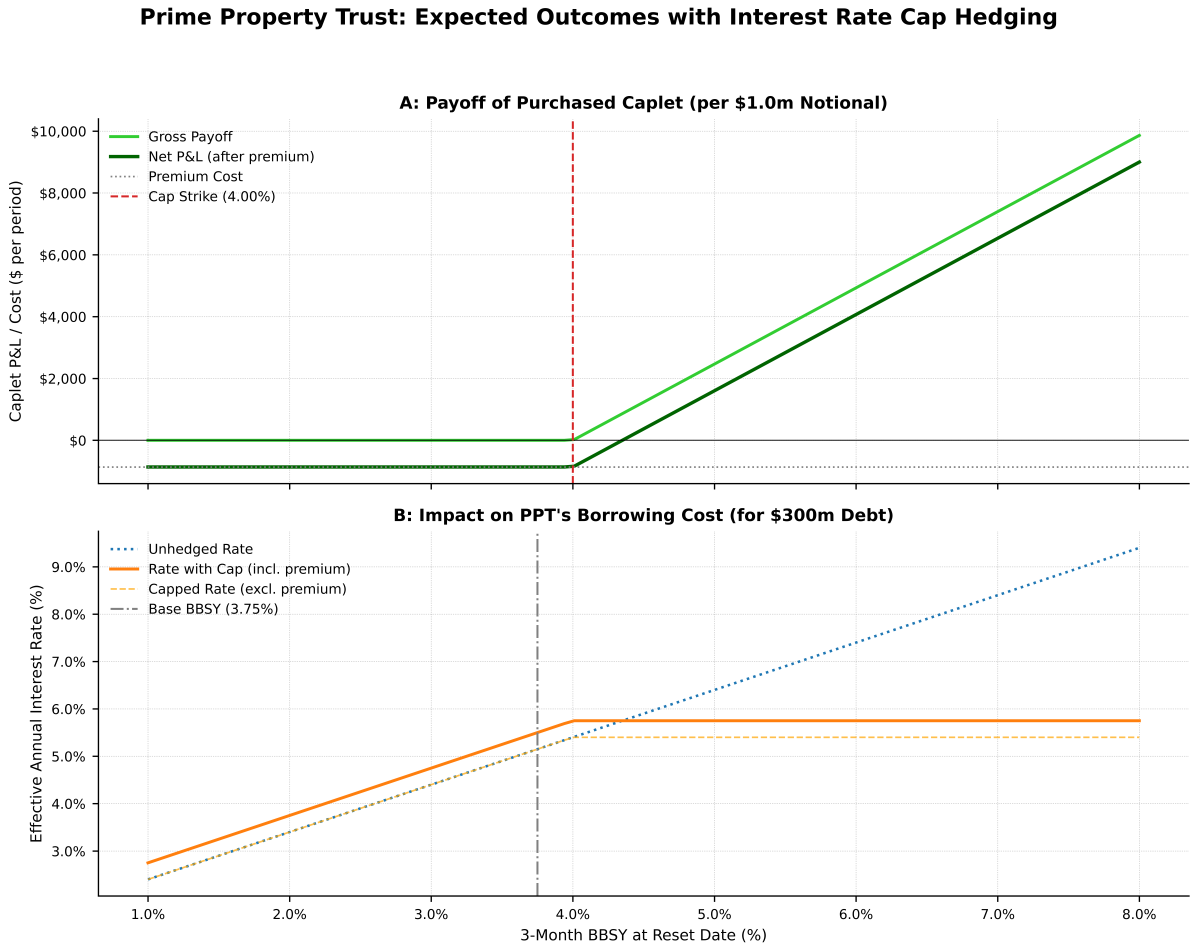

Figure 5: Payoff Profile of the Long Interest Rate Cap Position

5.5.7 Risks and Downside

The primary downside is the upfront premium, a sunk cost if rates remain below the strike. Counterparty credit risk, inherent in OTC derivatives, exposes the buyer to potential default by the seller when the cap is in the money; this risk is a subject of ongoing analysis, particularly regarding concentration and systemic implications within financial networks (Segoviano Basurto and Singh, 2008; Nanumyan et al., 2015). Basis risk can occur if the cap's reference rate or terms do not perfectly match the underlying loan, though careful structuring can minimise this. Such basis risk can be exacerbated if hedging contracts include termination rights triggered by the hedger's deteriorating credit quality, potentially removing the hedge when most needed (Babenko and Tserlukevich, 2024). The initial premium is also sensitive to prevailing implied volatility (Vega); purchasing when high volatility translates to a more expensive cap.

5.5.8 Feasibility and Suitability

Interest rate caps are standard, customisable OTC products readily available from financial institutions, making them highly feasible for entities like PPT. For PPT, a cap strategy is particularly suitable for addressing concerns about rising interest rates impacting budgeted costs and its Interest Coverage Ratio (ICR) covenant of 1.75×. By limiting the benchmark interest expense to the strike rate, a cap aids ICR predictability and compliance. Moreover, this hedging strategem reduces expected financial distress costs and aligns internal fund availability with investment needs, which is efficacious especially when external financing is costly (Geczy et al., 1997; Aretz et al., 2007). The Sterling Square (SS) facility, being non-income generating initially, particularly benefits from such protection without forfeiting gains from lower rates. The upfront premium is a budgetable insurance cost, and the absence of margin calls simplifies liquidity management.

5.5.9 Conclusion

Purchasing an interest rate cap offers Prime Property Trust a precise and strategically advantageous mechanism to mitigate exposure to rising 3-month BBSY rates. This instrument provides a ceiling on benchmark interest costs, directly supporting budget stability and management of the critical ICR covenant while allowing participation in favourable rate movements, net of the premium. The primary trade-off is the upfront premium against the value of asymmetric protection and covenant compliance. The high degree of customisation, coupled with the absence of ongoing margin calls, renders caps highly suitable for PPT's specific debt profile and risk management objectives, with the strike rate selection being a key determinant of cost and protection.

6 Hedging Rationale

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7 Q&A Stress-testing

Walk me through the mechanics of a cap. How does it work? What are the cashflows? What are the risks? What are the costs?

> Explain to me the difference between a cap and a collar. What are the risks? What are the costs? How do they work?

An interest rate cap, involves an upfront premium payment by the buyer (PPT) to receive payments from the seller if a specified reference interest rate (like 3-month BBSY) rises above a pre-agreed strike rate (the cap rate); this protects against rising rates while allowing participation in falling rates, with the main cost being the initial premium and risks including the premium as a sunk cost and counterparty credit risk. In contrast, an interest rate collar, combines buying an interest rate cap with simultaneously selling an interest rate floor; this creates a band for the interest rate, protecting the borrower if rates exceed the cap strike but also obligating them if rates fall below the floor strike (meaning they don't benefit from rates falling below the floor). The cost of a collar can be lower than a standalone cap, potentially even zero if the premium from selling the floor offsets the cap premium, but the key risk is forfeiting the benefit of interest rates falling below the floor's strike rate, unlike a cap which allows full participation in downside rate movements (net of premium).

Explain your use of CKLS forecasting. What are the underlying assumptions, motivations for its implementation and the limitations of the model? What are the benefits over a conventional model? How does it work?

How does your proposed hedging rationale align with current market conditions and the strategic requirements of Prime Property Trust? What are the key considerations in your analysis?

Explain to me the difference between a cap and a collar. What are the risks? What are the costs? How do they work?

Your presentation suggests a high probability of RBA rate cuts. Given the current date of May 20, 2025, what if the RBA decision later this month is to hold or even hike? How would that impact your strategy for PPT?

You cite several fundamental indicators for rate cuts (BayFarmCapital_Heat.pdf, Slide 3). Could you elaborate on the specific lags between these indicators changing and the RBA typically acting?

The sentiment analysis (BayFarmCapital_Heat.pdf, Slide 3) indicates 70% of market participants expect rate cuts. What is the source of this data, and how robust is this as an indicator compared to, say, pricing in the futures market or bond yields?

You mention PC2 of AUD Bond Yields trending down (BayFarmCapital_Heat.pdf, Slide 3). Can you explain what PC2 represents in layman's terms and why its inversion has historically preceded RBA rate cuts?

How do the longer-term macroeconomic factors like "War and tariff uncertainty" and a "Labour Government Ruling" (BayFarmCapital_Heat.pdf, Slide 4) quantitatively feed into your VECM or CKLS forecasts (BayFarmCapital_Heat.pdf, Slide 4)? Or are these qualitative overlays?

> How significant is the Fed's policy for the RBA's decisions, especially if domestic conditions in Australia diverge from those in the US?

The US Federal Reserve's policy, as indicated by its March dot plot forecasting two rate cuts in 2025, is significant for the RBA's decisions primarily by influencing global monetary policy expectations and potentially "reducing global policy divergence," which can "lessen pressure on the RBA to hold rates." Global interest rate differentials affect capital flows and exchange rates, which the RBA considers as part of its broader economic assessment. However, while the Fed's actions provide an important international context and can influence market sentiment and the relative ease of RBA policy implementation, the RBA's primary mandate remains domestic economic conditions, specifically Australian inflation and employment. Therefore, if domestic conditions in Australia were to significantly diverge from those in the US (e.g., Australian inflation remaining stubbornly high while US inflation falls), the RBA would be expected to prioritize its local mandate, potentially leading to a decoupling of policy paths, though the Fed's stance can influence the global economic landscape in which the RBA operates.

The case brief (CBA x UNIT Case Competition 2025 Case Brief.pdf, p. 8) states PPT's Treasury team is concerned about their "ability to meet budgeted cost obligations over the next year." How precisely does your proposed cap strategy provide them with budget certainty for interest costs?

> PPT has two new facilities: PCT ($100m at BBSY+1.20%) and SS ($200m at BBSY+1.50%). Does your hedging strategy differentiate between these two facilities, or do you propose a single blended approach? Why?

Our proposed interest rate cap strategy directly addresses the Treasury team's concern about meeting budgeted cost obligations by providing clear certainty on the maximum interest costs PPT will face over the next year. Here's how: the cap establishes a pre-agreed ceiling—the strike rate—on the 3-month BBSY, which is the floating benchmark for PPT's new loan facilities. If the actual BBSY attempts to rise above this strike rate on any quarterly reset date, the cap activates, and PPT receives a payment from the cap seller that effectively compensates for the higher interest cost on its loans for that period. This ensures that the benchmark component of PPT's interest expense will not exceed the cap's strike rate. The cost of this protection, the cap premium, is paid upfront and is a known, fixed amount that can be amortized and incorporated directly into the budget as a predictable "insurance" cost. Since the loan spreads of 1.20% for PCT and 1.50% for SS are also fixed, the combination of the capped benchmark rate, the fixed loan spread, and the budgetable premium allows the Treasury team to calculate and budget for the maximum possible interest payment for each quarterly period throughout the next year, thereby achieving the desired cost certainty

> The PCT facility will be refinanced at the end of its 3-year tenor (CBA x UNIT Case Competition 2025 Case Brief.pdf, p. 9). How does your current hedging proposal account for this refinancing risk?

Our current hedging proposal, which includes a 3-year interest rate cap specifically for the initial $100 million PCT facility, accounts for the refinancing risk at the end of its 3-year tenor primarily by seeking to ensure PPT approaches this refinancing point in a stronger financial position. The 3-year cap is designed to protect PPT against adverse movements in the 3-month BBSY during the life of the current facility, aiding in budget certainty and, critically, in maintaining covenant compliance. By mitigating interest rate risk over these initial three years, the strategy helps preserve PPT's financial stability and creditworthiness, which are beneficial when negotiating terms for the subsequent refinancing. The cap itself will expire concurrently with the original 3-year facility tenor and therefore does not directly hedge the interest rates or credit spreads that will apply to the new refinanced debt beyond year 3. However, our overall financial outlook and long-term strategy do consider this event; for instance, our financial model for PPT assumes the PCT facility is refinanced to a 4% fixed-rate loan after 3 years, and our broader strategic recommendations include eventually sourcing longer-tenor fixed-rate debt to build resilience against fluctuations.

The Sterling Square (SS) project commences construction on Day 1 and is only operational from FY27 (CBA x UNIT Case Competition 2025 Case Brief.pdf, p. 9). How does this impact PPT's ICR during the construction phase, and how does your strategy mitigate this specific risk?

Your presentation identifies "Interest rate fluctuations," "Inability to source immediate funding," and "Failure to meet covenants" as key risks. Beyond interest rate caps, what other recommendations do you have for PPT to manage its funding and covenant risks?

The FY25 EBITDA is $8.412m (CBA x UNIT Case Competition 2025 Case Brief.pdf, p. 10 ; BayFarmCapital_Heat.pdf, Slide 6). With $300m new debt, how did you arrive at the pro-forma ICR of 0.54x mentioned in Research.pdf (p. 19) and the FY26 ICR of 0.55x in your presentation (BayFarmCapital_Heat.pdf, Slide 6)? Please walk through the interest expense calculation.

The "Unhedged Interest Rate Sensitivity" graph (Research.pdf, p. 18 ; BayFarmCapital_Heat.pdf, Slide 6) shows an ICR breach at a BBSY of 0.20%. Can you explain the significance of this point?

The case requires PPT to maintain an ICR greater than 1.75x at all times (CBA x UNIT Case Competition 2025 Case Brief.pdf, p. 9). What are the typical consequences of a covenant breach beyond funding being withdrawn?

You recommend interest rate caps (BayFarmCapital_Heat.pdf, Slide 2). Why is retaining upside potential (BayFarmCapital_Heat.pdf, Slide 7) so critical for PPT that it outweighs the certainty of a fixed rate from a swap, especially given their dire ICR situation?

> The evaluation table (BayFarmCapital_Heat.pdf, Slide 7) gives "Interest Rate Caps" high marks. Could you elaborate on the "Key Costs and Risks" for caps, specifically "premiums vary with r_K and σ_{BBSY}"? How did you determine an appropriate r_K (strike rate)?

The key costs associated with interest rate caps are the upfront premium, which is non-refundable, and the risk of theta (time) decay. Crucially, this premium varies directly with market conditions

> Your recommended solution proposes an out-of-the-money option for the cap. How far out-of-the-money, and what was the trade-off analysis (cost vs. protection level) you performed?

The primary upfront cost of an interest rate cap is its premium. The Black ’76 model offers a precise mathematical framework for understanding how this premium, for each constituent caplet, is determined and how it varies with key parameters, notably the strike rate (R_K) and the volatility of the underlying forward interest rate (σ_j, which is derived from market observations of benchmark volatilities like σ_{BBSY}).

The value of a single caplet (C_j) under the Black ’76 model is given by,

$$C_j = P(0, T_j) N_V \tau_j \left[F_j(0) N(d_1) - R_K N(d_2)\right],$$

where $d_1 = \frac{\ln(F_j(0)/R_K) + \frac{1}{2}\sigma_j^2 T_{j-1}}{\sigma_j \sqrt{T_{j-1}}}$ and $d_2 = d_1 - \sigma_j \sqrt{T_{j-1}}$.

The terms $P(0, T_j)$, N_V, τ_j, $F_j(0)$, T_{j-1}, and $N(\cdot)$ represent the discount factor, notional principal, tenor fraction, forward rate, time to option expiry, and cumulative normal distribution function, respectively.

The model explicitly shows how the caplet premium varies with the strike rate R_K. The sensitivity, or partial derivative, of the caplet premium with respect to the strike rate is $\frac{\partial C_j}{\partial R_K} = -P(0, T_j) N_V \tau_j N(d_2)$. Since all terms on the right-hand side are positive, this derivative is negative. This mathematically confirms that increasing the strike rate (R_K) makes the caplet further out-of-the-money (or less in-the-money), reducing its payout probability and consequently decreasing the premium C_j. Conversely, decreasing R_K increases the premium.

The volatility of the underlying forward rate, σ_j (intrinsically linked to σ_{BBSY}), is a critical input in d_1 and d_2. The sensitivity of the caplet premium to this volatility (Vega) is $\frac{\partial C_j}{\partial \sigma_j} = P(0, T_j) N_V \tau_j F_j(0) \phi(d_1) \sqrt{T_{j-1}}$, where $\phi(\cdot)$ is the standard normal probability density function. This derivative is positive. Therefore, an increase in the volatility σ_j (reflecting higher σ_{BBSY}) leads to an increase in the caplet premium C_j, because higher volatility increases the chance of larger movements in the forward rate, making it more probable that the rate will exceed the strike. Other risks for caps include theta decay (time decay of premium), also quantifiable via option models.

The determination of an appropriate strike rate R_K for Prime Property Trust (PPT) was guided by the trade-offs evident from these Black ’76 pricing dynamics, aiming to balance effective risk mitigation with cost. A lower R_K offers greater protection but, as shown by $\frac{\partial C_j}{\partial R_K} < 0$, results in a substantially higher premium. A higher R_K (further out-of-the-money) yields a lower premium but protects only against larger rate increases. For PPT, an out-of-the-money (OTM) strike rate of 4.00% was selected when the reference 3-Month BBSY was approximately 3.75%. The Black ’76 model would quantify the premium for this 4.00% strike, demonstrating its relative affordability. This OTM level was chosen to provide meaningful protection against adverse rate movements that could threaten budget stability and the Interest Coverage Ratio (ICR) covenant, while ensuring the upfront premium was a manageable "insurance" expenditure. The Black ’76 framework thus provides the quantitative basis for this cost-benefit analysis.

The "Hedging Mechanics" (BayFarmCapital_Heat.pdf, Slide 9) show an example cap agreement with an upfront premium. How is this premium financed by PPT, and what is its immediate impact on their cash flow and ICR?

The average premium is stated as "around 0.2M per year at first, dropping to 0.17M after 3 years". Why does the premium drop? Is this for a new 1-year cap purchased each year, or for a longer-dated cap?

You recommend the interest rate cap is set 25bp above the current rate (BayFarm-Capital_Heat.pdf, Slide 9). What is the "current rate" benchmark you are using for this, and how often should this strike be re-evaluated?

The Research.pdf (p. 17-29) provides a detailed analysis of not hedging, FRAs, Futures, and Swaps. Could you specifically address why an Interest Rate Swap, which offers perfect cost certainty for the benchmark rate, was not chosen, given PPT's primary concern for budget stability (CBA x UNIT Case Competition 2025 Case Brief.pdf, p.8)?

Your evaluation table (BayFarmCapital_Heat.pdf, Slide 7) highlights "Roll Risk" for BAB Futures and "Liquidity constraints" for FRAs for multi-year tenors. How significant are these issues compared to the upfront cost of a multi-year cap?

If implied volatility (σ_{BBSY}) was significantly higher than current levels, making caps very expensive, what would be your alternative hedging recommendation?

The Research.pdf (p. 8-16) details the valuation of FRAs, BAB Futures, Swaps, and Caps. Can you elaborate on how you used the Black model (Research.pdf, p. 15-16) to price the recommended cap for PPT? What were your key inputs for forward rates and volatility?

The CKLS forecasting is mentioned (Research.pdf, p. 34 ; BayFarmCapital_Heat.pdf, Slide 8). How does this model's output (e.g., simulated paths of interest rates) feed into your cap pricing or selection of strike?

The VECM analysis (Research.pdf, p. 3-4 ; BayFarmCapital_Heat.pdf, Slide 4, Appendix) identifies long-run equilibria. How did this inform your view on where interest rates (specifically BBSY) are heading and thus your hedging decision?

The appendices in BayFarmCapital_Heat.pdf show various financial analyses (e.g., PCA of bond yields , GBM forecasting). Could you pick one and explain how it directly supported your final recommendation for PPT?

What are the primary sensitivities in your cap premium calculation? If your volatility assumption was off by X%, how much would the premium change?

The "Financial position after Hedging" (BayFarmCapital_Heat.pdf, Slide 10) shows required cash injections. You mention equity raising as a way to source these funds . What are the pros and cons for PPT, and did you consider debt funding or asset sales as alternatives for these injections?

In the Bear case (+25bp) on Slide 10 (BayFarmCapital_Heat.pdf), the cash injection in 2026 is $19.08M. How is this figure calculated, and does the cap fully protect against any further rate rises beyond this +25bp scenario in terms of additional injections needed for that year?

The assumption is made that "PCT is refinanced to a 4% fixed-rate loan after 3 years" (BayFarmCapital_Heat.pdf, Slide 10). What if PPT cannot secure fixed-rate funding at 4%? How does that affect your long-term strategy?

Your long-term strategy (BayFarmCapital_Heat.pdf, Slide 10) suggests phasing out interest rate caps as fixed-rate loans are secured. What is the timeline for this, and what are the risks during this transition?

For the $300 million notional, would you recommend a single cap, or a series of shorter-dated caps (a strip of caplets)? What are the pros and cons, especially regarding cost and flexibility? (BayFarmCapital_Heat.pdf, Slide 8)

How would PPT go about executing this cap? Would they approach CBA or multiple banks for quotes?

The presentation mentions "Continuous Monitoring" of the cap strike (BayFarmCapital_Heat.pdf, Slide 9). If the macroeconomic outlook changes significantly, can an existing cap be restructured or sold? What are the implications?

The "Research.pdf" is quite detailed on various econometric models and derivative valuations. How did the findings from this research document directly shape the recommendations in the "BayFarmCapital_Heat.pdf" presentation? Can you point to specific instances?

There's a lot of information in the appendices of your presentation (BayFarmCapital_Heat.pdf, Slides 11-45). Could you highlight the two most critical pieces of analysis from the appendix that directly support your choice of an interest rate cap with an out-of-the-money strike?

The case brief (CBA x UNIT Case Competition 2025 Case Brief.pdf, p. 6) emphasizes "Originality and creativity". How does your proposed solution demonstrate this beyond a standard hedging recommendation?

What was the biggest challenge your team faced in analyzing this case and arriving at your recommendation, and how did you overcome it?

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