The Calculation and Mathematical Modelling of Melbourne Crown Risk by Linear Regression Analysis

Yihao Jing*
School of Business, University of Sydney, Sydney 2008, Australia

*Corresponding author: yjin9257@alumni.sydney.edu.au

Abstract. To improve the performance and meet the rising tourist demand of luxury hotels, Crown Resorts Ltd. proposed to implement a new project, which is supposed to build a 6-star hotel resort with VIP gaming facilities in an iconic building at Barangaroo South (Jones Lang LaSalle 2013). Because the goal of Crown plans to build a luxury hotel with a casino, so the company requires a large amount of capital to launch the new project. The best financial solution to raise capital is to issue the bond. Therefore, according to the current market condition and previous experience of issuing Crown Note I & Crown Note II, here are our recommendations for the most beneficial strategy to issue a new bond--Crown Note III.

Keywords: Bond Issuing, Bond Risk Analysis, Melbourne Crown Company

1. Introduction
The Note III bond will be a floating rate and subordinated bond with a maturity date on 01/09/2060. The interest payment will be floating, decided by Australian Bank Bill Rate plus a margin (3.5%-3.8%) p.a. annually. There would be an associate call option the issuer can execute after ten years from issuing. In addition, the Note III has no conversion or voting rights. The offer period of Note III will be closed at 5:00 pm (Sydney time) 23/9/2016 for the Security holders Offer and General Offer; 5:00 (Sydney time) 30/9/2016 for broker firms offer (other key dates can be find in Figure X). Although the Note III do not have underwriting or third party trustees, it will be quoted on ASX and are expected to trade under ASX code “CWNHC”. In terms of distribution, applicants can subscribe Note III via multiple ways including online apply (Crown Resorts Ltd. n.d.).

2. Further justifications
2.1. Valuation--Price and yield
Considering the Australian capital market has witnessed the global descending in investing interest rate (Cash Rate, 2016), the rational recommendation to fund a project is offering floating debts. It is common in Australia that floating interest rate equals to the sum of Bank Bill Swap rate and a reasonable margin spread. As at 6 October 2016, the 6-month Bank Bill Swap is 1.98 (LIVE FEED OF BBSW, 2016). This floaters Crown offered adopted margin of 3.7% to estimate the price and yield. To price the bond as how market does, spot rates are needed to discount each future cash flow in order to get the exact market price of the debt. A viable method is called bootstrapping calculation. First of all, selecting
on-the-run government bonds to obtain the precise coupon rates. Because the 6-month government bond is off-the-run, using Bank Bill Swap rate as 6-month yield which is a commonly used benchmark in Australia. Then using linear interpolation to fill out the rest expected coupon rates. After filling out the coupon rate table, using bootstrapping to get theoretical spot rates. Literally, continuing to iterate previous spot rates to calculate current spot rates. Assuming the entire discounted cash flows sum up to the value, which equals to the par value of the bond.

\[
\text{Spot rate}_n = \sqrt{\frac{100 + \text{coupon}}{100 - \text{coupon} \cdot \sum_{i=1}^{n-1} \frac{1}{(1+\text{spot rate}_i)}}}
\]

Table 1. Discount factor

| period | years | semiannual | discount factor |
|--------|-------|------------|----------------|
| 1      | 0.5   | 0.0381     | 0.9626683     |
| 2      | 1     | 0.0268055  | 0.94847166    |
| 3      | 1.5   | 0.03090588 | 0.91300495    |
| 4      | 2     | 0.02450825 | 0.87194464    |
| 5      | 2.5   | 0.03700051 | 0.83387099    |
| 6      | 3     | 0.03198651 | 0.79403833    |
| 7      | 3.5   | 0.04140571 | 0.75768263    |
| 8      | 4     | 0.04366759 | 0.71038697    |
| 9      | 4.5   | 0.04598075 | 0.66724722    |
| 10     | 5     | 0.04835278 | 0.62162781    |
| 11     | 5.5   | 0.0476526 | 0.59925612    |
| 12     | 6     | 0.04697288 | 0.57647576    |
| 13     | 6.5   | 0.04630096 | 0.55515426    |
| 14     | 7     | 0.04665093 | 0.53522428    |
| 15     | 7.5   | 0.04601887 | 0.51560854    |
| 16     | 8     | 0.04543607 | 0.49414656    |
| 17     | 8.5   | 0.04475277 | 0.47282391    |
| 18     | 9     | 0.04313899 | 0.45156376    |
| 19     | 9.5   | 0.04252301 | 0.43028686    |
| 20     | 10    | 0.04191338 | 0.40903867    |
| 21     | 10.5  | 0.04177081 | 0.38852424    |
| 22     | 11    | 0.04162864 | 0.36876699    |
| 23     | 11.5  | 0.04148498 | 0.34926278    |
| 24     | 12    | 0.04133988 | 0.33002158    |
| 25     | 12.5  | 0.04119328 | 0.31106516    |
| 26     | 13    | 0.04104543 | 0.29238507    |
| 27     | 13.5  | 0.04089663 | 0.27398273    |
| 28     | 14    | 0.04074601 | 0.25684481    |
| 29     | 14.5  | 0.04059453 | 0.23988273    |
| 30     | 15    | 0.04044193 | 0.22311316    |
| 31     | 15.5  | 0.04030454 | 0.20653764    |
| 32     | 16    | 0.04015753 | 0.19016472    |
| 33     | 16.5  | 0.04000105 | 0.17398027    |
| 34     | 17    | 0.03984264 | 0.15804505    |
| 35     | 17.5  | 0.03971268 | 0.14234537    |
| 36     | 18    | 0.03956446 | 0.12693125    |
| 37     | 18.5  | 0.03942344 | 0.11179213    |
| 38     | 19    | 0.03927543 | 0.09692567    |
| 39     | 19.5  | 0.03912841 | 0.08236586    |
| 40     | 20    | 0.03898139 | 0.06804636    |
| 41     | 20.5  | 0.03883488 | 0.05400193    |
| 42     | 21    | 0.03868736 | 0.04026156    |
| 43     | 21.5  | 0.03854034 | 0.02691762    |

For instance, calculation of the spot rate for period 3 would involve previous calculations of spot rates 1.96% and 0.83% respectively. To simplify the iteration process, set up a variable (called accumulated factor) to integrate all the former discount factors, which divides the current coupon could get the present value of all the coupons. Then it is simple to compute the current spot rate.

\[
\text{Discount factor} = \frac{1}{(1+\text{spot rate}_i)}
\]

\[
\text{Accumulated factor} = \sum_{i=1}^{n-1} \frac{1}{(1+\text{spot rate}_i)}
\]
These spot rates depicted above are market benchmark, which represents the floored acceptable interest rate. Moreover, a marginal spread would be added up to attract investors. According to the rating of the company, Crown has an intermediate credit quality (Australia Ratings 2016). In this case, the marginal spread would be relatively high. 3.7% margin (average of proposed 3.5% and 3.8%) applied to this offering. As a result, the interest rates of this debt would be the spot rate plus 3.7% in different periods.

From the on-the-run government bonds, only 15 years spot rates could be estimated.

However, the newly designed bond has about 44 years until maturity (if not redeemed before maturity). In this situation, the rest of the data would be estimated on assumption. The spot rate curve below indicates that it maintains stable from year 10 to year 15.

**Table 2. Bootstrapping spot rate**

| period | years | coupon rate | interval | semiannual (semiannual spot rate | 1/(1+ia)^m | accumulated factor | annual spot rate |
|--------|-------|-------------|----------|---------------------------------|------------|-------------------|-----------------|
| 1      | 0.5   |             |          |                                 |            |                   |                 |
| 2      | 3     | 1.6700%     |          | 0.8350                          | 0.98077675 | 0.98077675       | 3.9200%         |
| 3      | 1.5   | 2.4600%     |          | 1.2300                          | 0.963981228| 2.92835478       | 2.4606%         |
| 4      | 2     | 3.2500%     |          | 1.6250                          | 0.937184968| 3.86554046       | 2.3702%         |
| 5      | 2.5   | 3.6667%     | 0.4167%  | 1.8333                          | 0.921040343| 4.77794479       | 3.7002%         |
| 6      | 3     | 4.0833%     |          | 2.0417                          | 0.884393918| 5.66238709       | 4.1373%         |
| 7      | 3.5   | 4.4996%     |          | 2.2500                          | 0.852393597| 6.51574679       | 4.5812%         |
| 8      | 4     | 4.9167%     |          | 2.4583                          | 0.81967127 | 7.33545649       | 5.0336%         |
| 9      | 4.5   | 5.3333%     |          | 2.6667                          | 0.783495949| 8.11890189       | 5.4961%         |
| 10     | 5     | 5.7500%     |          | 2.8750                          | 0.74515827 | 8.84640619       | 5.9706%         |
| 11     | 5.5   | 6.5600%     | -0.1000% | 3.0825                          | 0.728996159| 9.59306328       | 6.3904%         |
| 12     | 6     | 5.5500%     |          | 3.2775                          | 0.713979749| 10.30783608      | 6.7946%         |
| 13     | 6.5   | 5.4500%     |          | 3.4725                          | 0.700056721| 11.000928        | 7.2062%         |
| 14     | 7     | 5.3500%     |          | 3.6750                          | 0.687178249| 11.6947105       | 7.6139%         |
| 15     | 7.5   | 5.2500%     |          | 3.8725                          | 0.675298792| 12.3656904       | 8.0203%         |
| 16     | 8     | 5.1500%     |          | 4.0725                          | 0.664375897| 13.0395574        | 8.4251%         |
| 17     | 8.5   | 5.0500%     |          | 4.2725                          | 0.654370027| 13.7181576       | 8.8300%         |
| 18     | 9     | 4.9500%     |          | 4.4725                          | 0.645244386| 14.3336015       | 9.2340%         |
| 19     | 9.5   | 4.8500%     |          | 4.6725                          | 0.636964771| 14.9702492       | 9.6379%         |
| 20     | 10    | 4.7500%     |          | 4.8725                          | 0.629499422| 15.6000434       | 10.0423%        |
| 21     | 10.5  | 4.7250%     | -0.0250% | 5.0725                          | 0.621875786| 16.2169008       | 10.4372%        |
| 22     | 11    | 4.7000%     |          | 5.2725                          | 0.606692573| 16.8289265       | 10.8320%        |
| 23     | 11.5  | 4.6750%     |          | 5.4725                          | 0.592935407| 17.4142826       | 11.2270%        |
| 24     | 12    | 4.6500%     |          | 5.6725                          | 0.581590249| 17.9961831       | 11.6219%        |
| 25     | 12.5  | 4.6250%     |          | 5.8725                          | 0.570643633| 18.5667694       | 12.0169%        |
| 26     | 13    | 4.6000%     |          | 6.0725                          | 0.560882576| 19.1264451       | 12.4117%        |
| 27     | 13.5  | 4.5750%     |          | 6.2725                          | 0.549894593| 19.6703911       | 12.8066%        |
| 28     | 14    | 4.5500%     |          | 6.4725                          | 0.540067646| 20.2168067       | 13.1994%        |
| 29     | 14.5  | 4.5250%     |          | 6.6725                          | 0.530590145| 20.7438969       | 13.5923%        |
| 30     | 15    | 4.5000%     |          | 6.8725                          | 0.521045092| 21.2688472       | 14.0884%        |

**Table 3. Linear regression of spot rates from year 10 to 15**

| Regression Statistics | Multiple R = 0.99992013 | R Square = 0.999840032 | Adjusted R Square = 0.999822258 | Standard Error = 1.30024e-05 |
|-----------------------|--------------------------|-------------------------|-------------------------------|----------------------------|
| Observations          | 11                       |                          |                               |                            |

| ANOVA | df | SS  | MS   | F    | Significance F |
|-------|----|-----|------|-----|----------------|
| Total | 9  | 56252.3821 | 6252.3821 | 56252.3821 | 6252.3821 |
| Residual | 9 | 1.5126e-09 | 1.5126e-09 | 1.5126e-09 | 1.5126e-09 |
| Intercept | 1 | 0.052724112 | 0.052724112 | 0.052724112 | 0.052724112 |
| X Variable 1 | -0.000294033 | -0.000294033 | -0.000294033 | -0.000294033 |

3
Comprehensively, the rest 29-year spot rates are assumed to be consistent to this trend. Then a data analysis (regressing data from year 10 to 15) gives the interception is 0.052724112 and the coefficient is -0.000294033 (Table II). This means the estimated spot rate approximately equals to 0.052724112 - 0.000294033 * period (when the period is greater than 20). Then the rest 29-year data could be determined approximately (Table III). The result also supports the assumption that the interest rate of the whole market is encountering decrease.

Table 4. The predicted rest 29-year interest rate
After deriving all the required interest rates and assuming offering the bond at par value, the coupon can be determined by following equations.

\[
\text{Coupon} = \frac{(\sum 1/(1 + \text{semiannual interest rate})^n)}{principle/(1+\text{last discount rate})^{87}} \text{ principal},
\]

Let \( \text{discount factor}_n = \frac{1}{(1+\text{semiannual interest rate})^n} \),

\[
\text{Yield} = \frac{\text{principal} - \text{principal} \times \text{last discount factor}}{\text{sum of all discount factors}} = 3.764701818
\]

Therefore, the implied yield is 3.764701818%.

2.2. Strategy Analysis
The bond has several important factors that can attract the investors, such as the interest payment, maturity, and price. In addition, the company’s performance and external market environment could influence the factors thus affecting the bonds. Therefore, based on company’s operation and market, here are some reasons why we recommend the above strategy as our Crown Note III issuing mode are justified as fellow.

2.3. Interest payment
A bond with a floating interest rate is able to reduce the influence of interest movement. However, in order to make Note III more attractive, it is important to secure the yield of holders. Therefore, a fix premium is necessary. Especially, Note III is a long term cooperate bond, issuing in a period when market interest is experiencing a decreasing trend. Only in this way, the interest balance between issuer and bondholder could be establish.

2.4. Issuer
Although Crown Resorts Ltd is a Triple-B rating company, which is a low credit ranking company, Note III should be issued by Crown Company itself. This could help Crown to design the most suitable coupon rate and price to attract financing (Yao 2016). The reason of that is Crown Resorts Ltd knows its balance sheets better than other financial institutions. If the Note issued by the other higher credit rating financial institutions, Crown should provide the institution with internal financial report information. In order to avoid leak business trade secrets, Crown could design the Note through their own effort. Therefore, other financial institutions would not get the complete information. As a result, it will create the information asymmetry risk during the issuing process.

Moreover, because the company issuing bonds on its own, Crown Resorts Ltd can save a decent amount of consulting fee and management fee to improve a better performance, and there is no doubt that issuing the bond in public market is a good chance for company to show its strength, which can enhance its market image.

2.5. Option free bond with floating rate
The main reason to designed Crown Note III as an option free bond is to offset the interest rate risk in a controllable interval because of the floating coupon rate. With the changing of interest rate (See Figure), the bond interest rate also will fluctuate following the market interest rate, so that as for the long-term cooperation bonds like Crown Note III, a potential decrease of market interest would lead to a rapid increase of the coupon payment. Therefore, adopting the floating rate with option free bond can also avoid the interest rate risk and drop the loss.
Furthermore, a bond associates with a call right usually have less attractive to the market (Yao 2016). Given a floating coupon rate, the bond of Crown Resorts Ltd can provide benefit for both issuers and investors, which will not be forced to pay a large amount of interests and sold the bond in lower price. Speculators can also be attracted by this arrangement, because it secures the ability for company to consistently pay the coupon for a long period.

In addition, the reason of setting Note III as floating rate bond is based on the income pattern of Crown Resorts Ltd. This company is a group which mainly conducting entertainment business, so the investment recycle is relatively long. The floating rate is suitable for the long maturity bond because of keeping the price stably, which can attract the investors to reduce the reinvestment risk.

2.6. Maturity
The Note III is designed to have a long maturity until 2060, because the current license of Crown Resorts Ltd is expired to 2050. Therefore, the company may face some liquidity risks after 2050 because it is possible that there is no casino license of the Crown Melbourne Casino, which is the biggest business for Crown Resorts Ltd to earn the cash. Although Melbourne government is likely to continue to extend the license’ expiration date, which has already extended once from the year 2033 to 2050 in 2014, no one can promise that the casino license will continue to expand to a longer time (Savage 2014). Based on this information, in order to give the company more time to prepare to pay for the principal, the maturity of Note III is designed to the year 2060.

Furthermore, on account for the aging of Sydney hotels, there is also a big opportunity for Crown Resort Ltd to build a new high-end hotel but the returns on five-star hotels are lower, while the six-star hotels are lower and lower, especially in Sydney, where the development of luxury hotels is limited (Jones Lang LaSalle 2013). Therefore, designing a longer maturity for the bond can provide the company enough time to get the profit from the new project to pay the interest and principal.

2.7. Set as a subordinated bond with no conversion rights
In terms of the repayment rank when Insolvency occurs, Crown Note III is designed as a subordinate bond, equal to the previous Crown subordinate Note I and Crown subordinate Note II (Crown Resorts Ltd 2016). However, Note III issued later than the other two, so that the repayment rank of Crown Note III is lower. The stricter of repayment are listed in figure below. In addition, Crown Note III is designed as bond, which is not unconvertible (into Ordinary Shares or any other securities) and has no rights to vote.

In order to maximize shareholders’ interests, these arrangements can fully protect Crown’s autonomy in management, as well as maintain company equity structure. The company has no need to concern the potential influence on current operation other than pay interests. Thus, Crown can fully concentrate on long-term business plan.
Table 5. Issue bond and existing debt and equity

| Existing debt instruments and equity | Amount drawn on issue |
|-------------------------------------|-----------------------|
| Bank debt, market debt              | $2152 million         |
| Crown Note I and Crown Note II      | $900 million          |
| Crown Note III                      | $450 million          |
| Ordinary Shares                     | $4330 million         |

2.8. The timing choice of issuing

The basic principle for us to recommend issuing Crown Note III in October 2016 is based on the analysis of current trading bond performance of Crown Note I and Crown Note II. In order to successfully sell out Crown Note III, it is essential to pick a time when the market is confident with the corporate bonds from Crown Ltd. As the figure shows below, in general, an increasing trend can be found during 2016. Although a slight drop happened in September, it is mainly because of the coupon payment. The Simple Moving Average 5-day (SMA5) and Simple Moving Average 20-day line (SMA20) shows the increasing trend is likely to established again after the coupon payment in September. As for the Bollinger intervals, comparing to the beginning of the year, Bollinger are narrowing down. This movement indicates the volatility of Crown Note I spot price is low toward the end of 2016. For the trading volume factor, the data shows the trading volume is high around the coupon payment month, as well as the beginning of the year. However, towards the end of the year the trading volume of Crown Note I stays at a low level, which provides a window where have less influence to the value of on the run bonds when the company issue new bonds. A similar pattern can be found in Crown Note II as well. This timing we choose can reduce the dilution when issue extra bonds. With this timing choice, Crown Ltd. can keep its attraction of investors to hold company bonds, by minimize the price drop of on the run bonds, which protect the profit of holding Crown Note I and Crown Note II. In addition, by do it, a responsible corporate impression will boost the company’s performance in many other ways.

Figure 3. The performance of Crown Note I in 2016 (daily closing price)
2.9. How to secure a successful distribution of Crown Note III with a lower cost?

Crown Note III is designed as a disposable bond (one round issuing), with multiple ways to apply. There are two main factors we considered. First, as for the demand of the market, the market is expecting a low interest level recently, especially as a triple-B standard corporate bond. Thereby, Crown Note III has much higher return on other invest instruments. In addition, based on the experience of issuing Crown Note I and Crown Note II (Crown Resorts Ltd 2016), the demand of the new corporate bond will be magnificent. Moreover, speculator would also be attracted because Crown Note III is tradable on an efficient market shortly after issuing. This further secures the demand of Crown Note III. Secondly, we managed to design a variety of ways to apply for Crown Note III in including paper application, online application and group Application. The paper application is more convenience for local investors, especially when they want to eliminate any misunderstandings. A face-to-face meeting with the company will set a good impression for them, and give selling managers to use their selling techniques. The online application is designed for investors who want a convenient way to apply Crown Note III. The on-line apply system is back up with secured payment system, for example B-Pay, which fully protect investors’ privacy and their account safety. We also provide a group application chance, which can give wholesale investors individual contract.

With the large amount of potential demands and multiple ways to apply, it is possible to secure the sell without underwriter, so considering the cost of using underwriter to establish a seasoned issue can be large for an individual company, especially for the triple-B rating company, we recommend Crown Ltd issue Crown note by itself using a disposable issuing method without underwriting. In addition, Crown Resorts Ltd. is one of the largest entertainment companies in Australia, especially the Melbourne casino (Crown Resorts Ltd. n.d.), and the performance is also increase significantly. Moreover, Crown has a good relationship with the government, so the casino permission license can be continued to expand (Savage 2014). Therefore, even if there is not collateral for the bond, Note III also can attract plenty of investors and provide permission to pay the interest.

2.10. Tax status

The Crown Company’s goal for issuing this bond is to finance for building the new six-star hotel in Australia, so this bond is mainly issued in Australian ASX, which is able to reduce the foreign exchange
risk. Due to issue in Australian market, the key buyers are New Zealand and Australian buyers, so it is taxable for New Zealand and Australian holders and adopts the Australian tax law. Also, adopting the Australian tax law and paying more interest, the company can avoid tax in a reasonable way by reducing the free cash flow to increase the tax shield, so it can also make contributions to improve company’s performance.

2.11. Risk Analysis

Based on the above designing, there are some factors which will potentially lead to some risks for Crown Resorts Ltd during and after the bond issuing. This part will show four main risks—interest rate risk, liquidity risk, credit risk and foreign exchange rate risk. At last, some recommendations will be given to address these potential risks.

2.11.1. Interest rate risk. Fabozzi (2000) points out that if interest rate rise, the price of the bond will decrease. For investors, in order to avoid capital loss, they are probable to sell the bond before the bonds mature. In addition, generally long-term bonds carry more interest rate risk than short-term bonds (Mankiw 1984). Crown’s bond will have more interest rate risk because of the longer maturity. There is a lot of possibilities that company have to pay more payment and the price of bond would decrease beyond expect. On the other hand, according to Brunnermeier (2009), the bond credit rating could affect the interest rate that Crown company need to pay. As it is mentioned before, the credit rating of Crown Resorts Ltd is BBB, which means the bond has intermediate ability to pay back to debt and it is likely to default. There is an opposite relationship between interest rate and the level of credit rating. Because most investors are risk averse, they prefer high credit rating, stable and high solvency bonds. Therefore, in order to attract more investors, the bond of Crown Resorts Ltd should adjust interest rate higher. However, maintaining a high interest payment in a long period will put high requirements on their operation conditions. To sum up, interest rate risk will be one of the important sources of risk for Crown Resorts Ltd in a long period due to the low credit rating and the demand of high interest rate.

2.11.2. Liquidity risk. Fabozzi (2000) states that liquidity risk means that the bond is unable to be traded quickly in a certain period and reflect the market price. The range of dealer spread is the main measurement of liquidity risk. Only when the bonds are traded with enough liquidity, it can reflect the market value. As it is mentioned before, the credit rating of Crown Resorts Ltd is BBB, which is relatively low in current market. Therefore, it is hard to attract a great amount of investors when compete with other companies who own high credit rating and has the same yields. As a result, lacking of enough investments would lead to the shortage of Crown’s available fund capital, which will decrease the liquidity of Crown Resorts Ltd. As a result, the liquidity risk of Crown Resorts Ltd will influence the price of their bonds. Furthermore, because of the credit rating of Crown Resort Ltd, there are many government regulations and rules, which may limit Crown’s liquidity, such as the taxation of financial arrangements rules.

2.11.3. Credit risk. Credit risk is the probability that a bonder issuer (Casino Company) fails to make full and timely payment of coupon or principal (Fabozzi, 2000). Credit risk has two components including default risk and loss severity. Default risk is the risk associated with losses because of the failure of Casino to pay interests or principal when due. Loss severity is another credit risk refers to the value of bond investor will lose if the Casino defaults. For example, the casino company may launch a new project, which cost a lot of capital. This could produce a big pressure on company’s finance department and company has not enough capital to pay the interests. Therefore, Casino will default and unwilling to make the coupon payments to investors.

Bond with credit risk traded at high yield has higher spread risk. There is a possibility that spread will raise because the issuer has become less creditworthy. Crown has obtained credit ratings from Rating Agencies, so the rate of Crown Resort Ltd can change if the rating method changed. The change of credit rating may have adversely impact on market price and liquidity of bonds. Further, Crown’s
performance such as margins or cost of capital may also be affected by the downgrade credit of rating (Brunnermeier, 2009). This will result in credit rating agencies downgrade the casino rating next period. As a result, investor may choose other bonds but not Crown companies’ bond. For Crown Casino, there will be a huge

2.11.4. Foreign exchange-rate risk. The denomination and currency for payment for Crown’s bond is Australian dollars but not New Zealand dollars. For New Zealand investors, there will be a currency exchange risk. The price of corporate bond will fluctuate according to the changes of exchange rate of Australian and New Zealand dollars. If these New Zealand tax resident holders invest a large number of funds in Crown Resort Ltd, the changes of exchange rate will be important. Additionally, the interest income is taxable in New Zealand. Therefore, the gain or loss of their investment will also have a significant impact on their income. That means if the exchange rate increased dramatically, exchange rate will have a negative influence on New Zealand investors. Therefore, the capital funds from New Zealand investors will see a significant downward trend.

2.11.5. Other potential risks. Further risks can also rise after the issuing. For example, the financing capacity will decrease after issue more debt from the company. The Crown is already rating as a BBB standard company, if company put up more payable interest on its balance sheet. A potential rating drop can happen. The change on balance sheet can also affect the performance of company ordinary share, so investors may lose confidence of holding financial assets from Crown Ltd. This would damage Crown’s share holders’ profit. Opportunity costs are also worth to consider by managers. Especially, Crown Note III is a long term cooperate bond attached to a project has a long investment recycle. Company may lose the opportunity to invest in other businesses with inefficient of liquidity.

2.12. Recommendations
In order to avoid or relieve these risks, some advices are given. Firstly, as for managing the interest rate risk, which is one of the most important risks because of current market interest rate fluctuating. Based on this situation, company can consider to issue floating rate bonds rather than fix rate bonds, as we designed, the interest payment will change according to the market interest rate, so that company could avoid paying more interest payment if the market interest rate drops sharply.

Moreover, company can use financial derivatives to hedge the interest risk expose. For example, Crown can use a long position of Treasure bond to offset the potential loss when the interest rate decrease.

Similarly, as for the foreign exchange risk, using the foreign exchange futures can also control. For example, if the exchange rate is potentially increase, company could long the exchange futures to avoid the exchange risk. In addition, the bond is designed to issue in Australian market (ASX) and settled by Australian dollar, which can solve the foreign exchange problem for the company.

Thirdly, as for the credit risk and liquidity risk, compared to the other industry companies, Crown as for a famous casino entertainment hotel should be more careful to conduces its business to guarantee a consistence income because of the larger daily cash flow. Therefore, company could pay the interest timely on the coupon payment day and investor would not lose confidence to the company. In addition, company should strengthen the disclosure of information. This could let investor to know the company timely information about business and project. Moreover, a close connection with banks can also help with short-term loan if needed.

3. Conclusion
To explain the details of designing Crown Note III, this justification document is based on the research of current external market condition and company internal situations. After a close examine and a calculation, the expected coupon rate is estimated as 3.7647%, which is the suitable interest payment for the company. Moreover, according to the market performance of Crown Note I and Crown Note II, the potential market demand would secure the successful of selling the 450 million bonds (Crown Resorts Ltd. n.d.). We also manage to design an efficient way to distribute Crown Note III. In terms of
reducing the impact on price of company shares and on-the-run bonds, we carefully choose an ideal timing to issue the Crown Note III. In addition, a risk analysis shows the potential risks, which Crown Ltd. may face. Accordingly, it would help the company to minimize the influences. To summarize, the Crown Note III is designed to meet the profit of both investors and the company. It will be a win-win choice if Crown adopts this design to issue Crown Note III.

References
[1] Australia Ratings 2015, Crown Subordinated Notes (ASX:CWNHA), viewed 7 October 2016.
[2] Brunnermeier, M. K. 2009, Deciphering the liquidity and credit crunch 2007–2008. The Journal of economic perspectives, 23(1): 77-100
[3] Cash Rate 2016, Reserve Bank Of Australia, viewed 4 October 2016, <http://www.rba.gov.au/statistics/cash-rate/>
[4] Crown Limited 2012, Subordinated Notes Offer, viewed 7 October 2016. Crown Resorts Ltd. n.d., Crown Subordinated Notes II, viewed 7 October 2016.
[5] Crown Resorts Ltd. n.d., Benefits of the Crown Sydney Hotel Resort, viewed 7 October 2016, <http://www.crownresorts.com.au/>.
[6] CWNHA Crown Limited 2016, eoddata.com, viewed 7 October <http://eoddata.com/stockquote/ASX/CWNHA.htm>.
[7] CWNHB Crown Limited 2016, eoddata.com, viewed 7 October <http://eoddata.com/stockquote/ASX/CWNHB.htm>.
[8] Fabozzi, F. J. 2000, Bond markets analysis and strategies. Pearson Education India. Folkestone 2015, Australian Hotel Sector Outlook, viewed 7 October 2016.
[9] LIVE FEED OF BBSW 2016, The Australian Financial Markets Association, viewed 6 October 2016, <http://www.afma.com.au/data/BBSW>
[10] Mankiw, N. G. 1984, Summers L H. Do long-term interest rates overreact to short-term interest rates?
[11] Crown Resorts Limited 2016, Morningstar.com, viewed 7 October, <http://datanalysis.morningstar.com.au.ezproxy1.library.usyd.edu.au/af/company/corpdetails?ASXCode=CWN&xtm-licensee=datpremium>.
[12] Savage, A. 2014, Melbourne's Crown Casino has its licence extended to 2050, ABC, viewed 7 October 2016, <http://www.abc.net.au/news/2014-08-22/melbourne27s-crown-casino-has-its-license-extended-to-2050/5689370>.
[13] Yao, J. 2016, Fixed Income Securities (FINC6014), The University of Sydney, Sydney, 28 July 2016, viewed 7 October 2016, <http://blackboard.econ.edu.au>.